



SIMS IN SIGHTS
HOW MARKET FOR
MILITARY TRAINING
DEVICES SIZES UP
CENSUS P26

SUPERMARKETING
SJI to combat Embraer's
bestselling E-Jets with
cut-price lease deals on
Russian-built regional **14**

BACK ON TRACKER
Brazil revives venture
with US firm to refurbish
and repower ex-USN
Grumman S-2s **25**

FLIGHT

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AN-140

PRIDE OF IRAN

Why the country's dream of creating its own
commercial aircraft industry turned to disaster



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COVER IMAGE

Babak Taghvaei wrote our piece on the IrAn-140 and provided images. EP-SFE, operated by Safir Airlines is shown at Shahin-Shahr airport. Cover Story P32



BEHIND THE HEADLINES

Air transport editor **David Kaminski-Morrow** (left) and editor **Murdo Morrison** were in Dubai, where they got to meet many of the bosses of the more than 30 airlines gathered for the **Arab Air Carriers Organisation** annual summit (P9, 11)



NEXT WEEK MEBA FOCUS

Ahead of the Middle East Business Aviation show in Dubai, we examine the state of this important market

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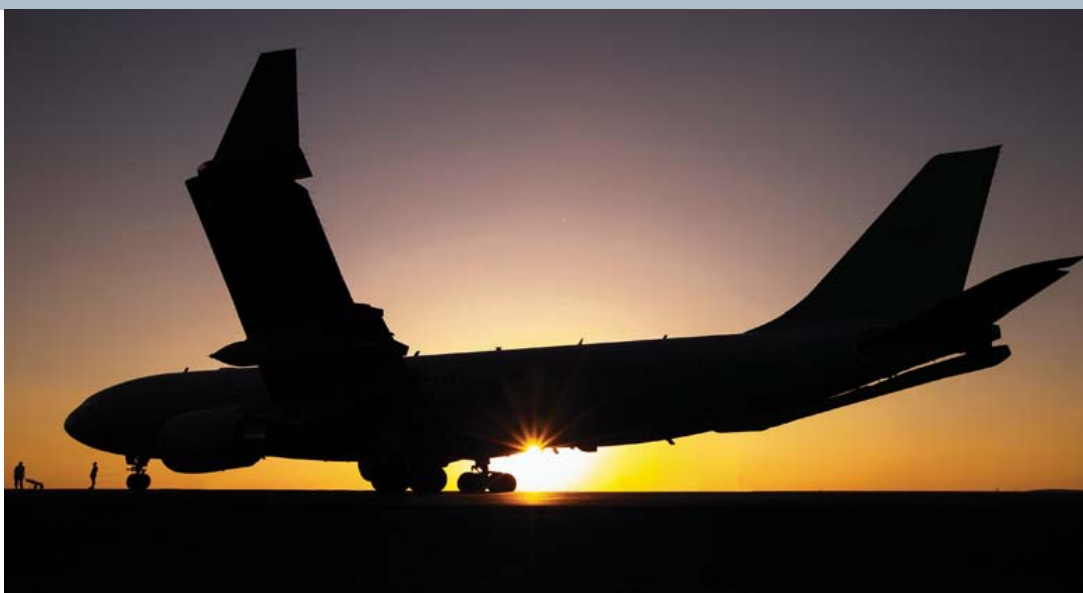
IMAGE OF THE WEEK

Support personnel from the Royal Australian Air Force prepare an Airbus KC-30A (A330) tanker/transport to support the coalition campaign against Islamic State insurgents in Iraq. Australia's Operation Okra commitment also includes six combat-ready Boeing F/A-18F Super Hornets

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Commonwealth of Australia

THE WEEK IN NUMBERS

30%

Flightglobal dashboard

The percentage staff cut, and a fleet sale-and-leaseback, needed to save Malaysia Airlines after its two tragedies

€4.3bn

flightglobal.com

The current budget for troubled Berlin Brandenburg airport, which now might be opened in 2017 – just five years late

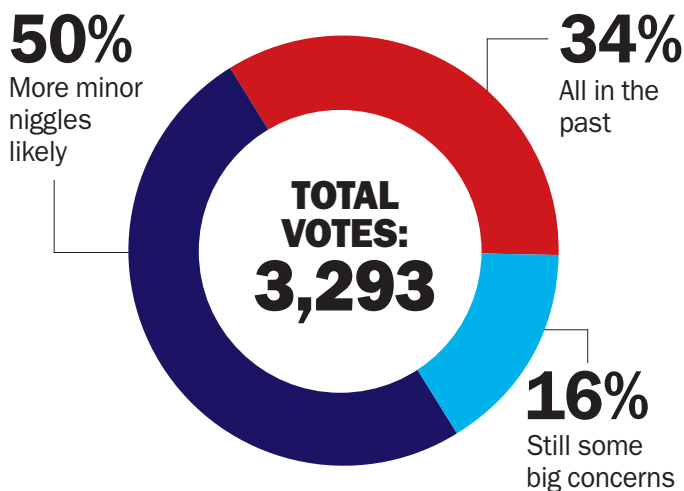
5,000

UK Space Agency

UK space sector jobs created over two years, taking the total to 34,000 in an industry worth £11.3bn (\$17.7bn)

QUESTION OF THE WEEK

Last week, we asked: **787 entry-into-service problems**. You said:



This week, we ask: **Are France and Germany being protectionist by blocking Gulf carriers from their airports?**

- ☐ Yes, blatantly so ☐ Yes, but only balancing playing field
☐ No, they realise competition is good

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CAE offers training centres, training services, and simulation products for maritime patrol aircraft.

Back in the battle

Approval for the Captor-E radar has given a fillip to Eurofighter's export prospects. If Dassault can follow Saab's success, European manufacturers will hold their own in the contest for orders

Last week was a pretty good one for two of Europe's remaining fighter manufacturers, as the continent's four Eurofighter nations at last committed real money to provide the Typhoon with a new-generation radar, and as Saab received strong and long-term backing from new customer Brazil.

The wait to get formal approval for the Eurofighter's Captor-E active electronically scanned array (AESA) radar from Germany, Italy, Spain and the UK has been a long one, and has without question harmed the type's export prospects over the last few years – remember its near-miss with the United Arab Emirates, for example. But the industry's faith in having self-funded the work to date has been rewarded, with a €1 billion (\$1.3 billion) deal signed with the Euroradar consortium to complete development and integration of the “E-scan” sensor.

There remains a problem here, however. Welcome as the new development is, it still stops short of any of the

The Captor-E deal adds much-needed and overdue substance to Eurofighter's sales claims

Eurofighter nations wholly committing themselves to fitting the Captor-E to any of their aircraft. The UK has a clear roadmap and aspiration to do so, but as the desire of its cash-strapped and less combat-minded partners might be less immediate, it is hedging its bets by also backing a national-specific alternative. Seen positively, this means potential future customers could have a choice of two AESA systems for their combat aircraft.

With production for its core nations now in its final Tranche 3A phase, Eurofighter needs to finalise new



Still life in the old dogfight yet

orders, if its lines with Airbus Defence & Space, Alenia Aermacchi and BAE Systems are to continue building Typhoons beyond late this decade. Sales officials and chief executive Alberto Gutierrez have talked a good game for the last couple of years about the addition of new capabilities, and the Captor-E deal adds much-needed and overdue substance to their claims.

Things are looking good for Saab too, with a senior Brazilian air force official having revealed long-term plans for the service to build on its initial, 36-aircraft buy with additional batches that should treble this fleet strength to 108 jets.

The Swedish company's F-X2 selection and recent \$5.8 billion contract with the Latin American nation could prompt a fresh wave of buyers for the E/F-model fighter, and has helped the manufacturer to forget its disappointment in Switzerland earlier this year.

Now, if Dassault can succeed in getting its Rafale deal with India on contract, the European dogfight can really continue for a few more battles yet. ■

See This Week P6, P7

Drone invasion: FAA fights back

The US Federal Aviation Administration has won an important – and necessary – victory in its struggle to contain the safety risks posed by the proliferating hordes of small unmanned air vehicles.

The regulator must move swiftly now to propose regulations for operating small UAVs commercially.

A photographer, Raphael Pirker, allegedly flouted an FAA ban on commercial UAV flights in the most reckless possible manner, encroaching on both pedestrians and helicopters, according to the FAA.

An administrative law judge last March enflamed the issue, ruling that the FAA has no legal authority to regulate small UAVs as aircraft.

The National Transportation Safety Board, the appel-

late authority, on 18 November overturned this reasoning, pointing out that any flying object – no matter how small or piloted – is subject to the FAA's authority.

That is not to say the FAA has behaved well. In 2007, the agency abandoned a plan to draft regulations, preferring to ban commercial UAVs. Congress has mandated it to develop regulations by 2015.

Commercial UAV operations promise incredible opportunities, but also many hazards. The FAA's head-in-the-sand policy is much more dangerous than an unenforceable ban. The community needs – and, in fact, is begging – for regulations. The FAA is long overdue meeting its responsibility. ■

See This Week P8



To find out more about the biggest military stories each week, visit our landing page at flightglobal.com/defence



BRIEFING

ATK/ORBITAL UNDETERRED BY LAUNCH FAILURE

MERGER The spectacular 28 October launch failure of an Orbital Sciences Antares rocket has delayed a proposed merger with ATK, but has not derailed the deal. When announced in April, the companies hoped to close the all-stock merger by year-end, but now look to close on 27 January 2015, after shareholder votes on 9 December. Orbital's third flight under a NASA contract to resupply the International Space Station ended in a fireball seconds after launch.

DELTA COULD MOVE TOWARDS AIRBUS

ANALYSIS Delta Air Lines could be set to confirm an order for 25 Airbus A350-900s and 25 A330-900s, according to an unconfirmed report from the Leeham News and Comment website. Airbus and Delta – which has also been considering a competing offer from Boeing – were not immediately available for comment.

INDIAN SUKHOI FLEET RESUMES OPERATIONS

SAFETY India's air force has resumed flying activities with its Sukhoi Su-30MKI combat aircraft, after lifting a grounding order imposed following an uncommanded ejection involving Russian-built aircraft SB 050 on 21 October. The service says it is "satisfied with the changes that have been carried out on all aeroplanes", and that a court of inquiry is poised to deliver its report on the incident.

OMAN AIR TO STRETCH DREAMLINER FLEET

ORDER Oman Air is to trade four of its on-order Boeing 787-8s up to the -9 variant, newly-appointed chief executive Paul Gregorowitsch has revealed. The carrier will take delivery of two 787-8s at the end of 2015, but its remaining examples will be converted to the stretched model to meet demand for a higher-capacity aircraft.

ELBIT TUNES UP J-MUSIC FOR A400M TRIAL

EVALUATION Prime contractor Diehl BGT Defence has awarded Elbit Systems a one-year contract to supply its J-Music directional infrared countermeasures technology for trial use with the German air force's Airbus A400M transport. A three-turret configuration to be tested during the "Flash" project will provide 360° protection against attacks made using heat-seeking surface-to-air missiles, Diehl says.

ROSETTA 'IN FINE FORM', SAYS ESA

SPACEFLIGHT The European Space Agency says its Rosetta spacecraft remains "in excellent condition" following the deployment of its lander, Philae, to the surface of comet 67P/Churyumov-Gerasimenko on 12 November. Philae's mission ended after about 64h when its batteries ran out, but Rosetta will continue to track the comet as it speeds towards its closest pass to the Sun in August 2015.

CHINA PLANNING MARS ROVER MISSION

EXPLORATION A Chinese Mars rover concept shown at the Airshow China event in Zhuhai is linked to plans to land on the planet around 2020 and return samples to Earth around 2030. According to state news agency Xinhua, the Mars rover will be solar powered and weigh about 180kg (397lb).

AMAC BREAKS GROUND ON NEW HANGAR

MAINTENANCE Swiss VIP aircraft completions company AMAC Aerospace has broken ground on a fourth hangar at its Basel airport base. The 7,280m² (78,400ft²) construction is scheduled to open in the third quarter of 2015, housing VIP airliner maintenance.



Serdar Kahy/Saab

The first batch features 28 single-seat and eight twin-seat aircraft

STRATEGY BETH STEVENSON LONDON

Brazil reveals full Gripen fleet plan

Service confirms intent to acquire 108 multirole fighters, as Brasilia targets indigenous manufacturing for Saab type

A leading Brazilian air force officer has confirmed that an eventual total of 108 Saab Gripen NG multirole fighters will be acquired for the service.

Following an announcement in October that a \$5.8 billion contract had been signed for a first batch of 36 aircraft, the air force official told the IQPC International Fighter conference in London on 18 November that Brazil's full requirement will be for three times this number.

"We had in 2007 a feasibility study to imagine future scenarios," the official says. "They reached that final number based on the requirements for the future."

The Gripens will initially replace Dassault Mirage 2000C fighters that have already been retired, and eventually the Northrop F-5EM and Alenia/Embraer A-1M (AMX) aircraft that are still in service.

Deliveries will be made in three batches, with the first to include 28 single-seat fighters and eight twin-seat examples.

Some 21 of these initial aircraft will be made by Brazilian and Swedish engineers, with the remaining 15 to be wholly built in Brazil.

The air force has yet to decide how many of its remaining planned 72 aircraft will be produced in the twin-seat configuration, the official says.

Brazil has been in discussions with the US Navy regarding the ideal mix of aircraft to meet its needs, and also with the South African Air Force, which operates the Gripen.

In conjunction with Brazil's national defence strategy released in 2008 – which encouraged all defence contracts to favour local industry – 80% of the aerospace contracts will be bid for by Brazilian industry, the representative says, adding: "We are comfortable to now say that the transfer of technology is what we aimed for."

The Denel Dynamics A-Darter air-to-air missile to be integrated on to Brazil's Gripens should receive its final qualification in late November, the official says, adding: "This will be on the Gripens that we hope to have by 2019."

The type will also carry the indigenous Mectron MAR-1 air-to-surface/air-to-air/anti-radiation missile.

In preparation for its future fleet, the Brazilian air force's first two pilots to undergo training on the Saab fighter completed 50min debut sorties in Gripen Ds on 19 November, accompanied by Swedish instructors from Satenas air base.

The pilots will spend six months training in Sweden, before becoming the first Brazilian instructors for the Gripen E/F. ■



Bristow details S-92 contingency plan
THIS WEEK P8

THIS WEEK

AVIONICS CRAIG HOYLE LONDON

AESA radar agreement lifts Eurofighter sales prospects

Partner nations to complete development of Captor-E amid push for export business

Eurofighter partner nations Germany, Italy, Spain and the UK have agreed to complete the development and integration of an active electronically scanned array (AESA) radar for the Typhoon.

Agreed during a four-nation ministerial meeting held at Selex ES's Edinburgh site in Scotland on 19 November, the development will lead to the completion of work on the Euroradar consortium's Captor-E sensor. Approval of the €1 billion (\$1.3 billion) deal via the NATO Eurofighter and Tornado Management Agency follows an in-principle agreement linked to a "Radar 1+" configuration announced at the Farnborough air show in July.

The Euroradar partners had self-funded AESA development activities up to this point, including the installation of a Radar 1+ sensor and array repositioner in BAE Systems-operated instrumented production aircraft IPA5. The radar was returned to Selex after initial flight tests from July, which checked its installation and additional power and cooling system performance. Selex parent company Finmeccanica says its involvement in the Captor-E deal is worth more than €400 million.

Flight testing will resume in early 2015, including tests with



A repositioner will provide a 200° field of regard for the system

the radar transmitting, says system integrator BAE, which values its role in the project at £365 million (\$573 million). The test process will also involve Airbus Defence & Space in Germany with its twin-seat aircraft IPA8, plus the use of instrumented "target" aircraft.

Once development work and test activities are complete later this decade, Captor-E will be available for installation in remaining new-build Tranche 3A examples of the Eurofighter. The system could also be retrofitted to Tranche 2 production aircraft, which will require structural modification to accommodate the system.

With no moving parts in its antenna, the new sensor will offer "increased detection and tracking

ranges and enhanced electronic protection measures", says BAE, as well as reduced maintenance requirements. The use of a repositioner will provide a 200° field of regard for the system.

The availability of the AESA system will provide a lift to Eurofighter as it seeks additional export sales. "The signing of this contract is a massive boost to all of us and is a pivotal moment," says Eurofighter consortium chief executive Alberto Gutierrez.

Separately, the UK is advancing the Selex-led development of a national-specific AESA system for potential integration with some of its Typhoons, having signed a £72 million deal earlier this year. ■

INVESTIGATION

MH17 wreckage recovery team on schedule

Dutch air accident investigators started recovering the wreckage of Malaysia Airlines flight MH17 from its crash site in eastern Ukraine in mid-November.

In a 17 November statement, the Dutch Safety Board said the recovery team had been able to work as planned, recovering parts of the destroyed Boeing 777-200ER, on the second day of its expected five-day activity.

"Among others, the tail section of the aircraft was recovered," the organisation says.

Recovered wreckage is being taken to Torez in Ukraine, from where it will be transported by train to Kharkov, and then on to the Netherlands.

Dutch investigators are working on a partial reconstruction of the aircraft to support their activities and determine the exact cause of the crash.

Flight MH17 was lost on 17 July as it passed over eastern Ukraine, en route from Amsterdam to Kuala Lumpur.

Investigators have been trying to determine whether the aircraft – registration 9M-MRD – was brought down by hostile action, possibly with a surface-to-air missile. ■



Evidence will be transported to the Netherlands for inspection

DEVELOPMENT MICHAEL GUBISCH LONDON

Airbus to build A330-based Belugas

Airbus has launched the development of an A330-based successor for its A300-600ST Beluga transport fleet.

The airframer says it will build five "new Belugas", the first of which is scheduled to enter service in mid-2019.

Like its predecessor, the new aircraft will feature a lowered cockpit section to facilitate the movement of large airframe seg-

ments on the main deck in an extended cargo bay structure. Airbus says it will be able to use a "large" proportion of existing components and equipment from the A330 series during the project.

Meanwhile, the airframer's existing five-strong Beluga fleet is to be gradually retired by 2025.

The General Electric CF6-powered aircraft were manufactured between 1994 and 2001, Flight-

global's Ascend Fleets database shows. Airbus is aiming to double the capacity of its current fleet by 2017 through efficiency initiatives, such as the construction of dedicated hangars that will permit loading of the aircraft in all weather conditions.

The company says additional capacity is required to match the production ramp-up of the A350 and other programmes. ■

REGULATION STEPHEN TRIMBLE WASHINGTON DC

Ruling strengthens FAA UAV enforcement powers

The US National Transportation Safety Board has given the Federal Aviation Administration a major victory in the regulator's efforts to govern the commercial use of unmanned air vehicles in the national airspace.

In an 18 November legal decision, the NTSB upheld the FAA's authority to regulate UAV operations under Part 91 regulations, which apply to general aviation-category aircraft.

The decision also struck down an administrative law judge's ruling last March that the FAA has no authority to regulate UAVs, after he determined that so-called "model" aircraft are exempt from Part 91 regulations.



Amazon's unmanned parcel delivery plans may be affected

In approving the FAA's appeal, the NTSB also sent the case back to the judge to determine whether the UAV operator should be subject to a \$10,000 fine for allegedly operating a Ritewing Zephyr recklessly on a commercial flight.

Under contract by the University of Virginia, Raphael Pirker

produced a promotional video in 2011 using the flying wing-shaped Zephyr UAV as a camera platform. The FAA accused Pirker of flying the air vehicle in a reckless manner over populated areas of the campus, causing one pedestrian to duck to avoid a collision, and also of flying it within 30.5m (100ft) of a heliport.

Since 2007, the FAA has deferred initiating a rulemaking process to develop regulations that will apply specifically to UAV operations, instead applying Part 91 regulations. In 2012, Congress ordered it to publish a draft rulemaking process for small UAVs weighing less than 29.5kg (65lb) before 1 January 2015.

The Federal Aviation Act of 1958 was passed when UAVs were still largely science fiction, but the law "expressly defined the term as any airborne contrivance 'now known or hereafter invented, used or designed for navigation of or flight in the air'."

The Pirker case ruling strengthens the FAA's ability to enforce a nationwide ban on most commercial uses of UAVs while specific regulations are drafted.

Except for a handful of exemptions, this has stifled a rapidly growing number of people and companies that hope to launch a wide range of commercial services using UAVs. ■

ROTORCRAFT DOMINIC PERRY LONDON

Bristow details SAR contingency plan

Sikorsky's larger S-92 could be utilised if AgustaWestland is unable to deliver sufficient AW189s by start of UK contract

Bristow Helicopters could be forced to use Sikorsky S-92s as an interim replacement for the AgustaWestland AW189 on its flagship UK search and rescue contract, if sufficient numbers of the latter cannot be delivered in time.

The operator is due to begin taking over SAR work from the UK armed forces next year, coinciding with the phased retirement of the nation's Westland Sea King fleet. Two bases – at Inverness and Humberside – are due to go live on 1 April 2015.

A pair of 8.3t AW189s are due to be based at Inverness – which will take on SAR responsibilities from the Royal Air Force's 202 Sqn based at Lossiemouth – with a third airframe to also be located there for training.

However, AgustaWestland has yet to obtain certification from EASA for the SAR variant of the AW189. In October the company indicated it would be able to deliver a maximum of two of the SAR-rolled rotorcraft to Bristow this year, although the second of



The Anglo-Italian airframer has yet to obtain EASA certification for the variant

these was likely to be pushed into 2015.

That schedule would give the operator only a small window in which to complete training on the new helicopters before the 1 April deadline.

Bristow says it is working "to prepare the AW189 for UK SAR", but has "robust contingency plans" in case the rotorcraft is not ready in time. That contingency

would see it instead begin operations at Inverness using the larger S-92, which it is also deploying to five other bases under the terms of the 10-year, £1.6 billion (\$2.5 billion) contract.

There are signs, however, that the first delivery of a SAR-rolled AW189 may be imminent, with images of a completed example bearing a pre-delivery registration at Bristow's Norwich, UK

facility having appeared on Internet forums. AgustaWestland intends to build the majority of the UK's SAR fleet at its Yeovil plant in Somerset, but the initial example was assembled at Vergiate in Italy.

There are signs that the first delivery of a SAR-rolled AW189 may be imminent

The smaller AW139, which is non-compliant with the contract specifications, also could be in preparation as a back-up.

Meanwhile, the construction of the Inverness and Humberside facilities are on schedule, says Bristow, with "pre-operational activity", such as training with other emergency services, due to commence on 5 January. It also hopes to shortly announce an alternative to the now-closed Manston airport in Kent, which it was due to utilise from 1 July. ■



Airbus relaxed over
A330neo orders
commitments
AIR TRANSPORT P10

THIS WEEK

DEBATE MURDO MORRISON DUBAI

Europe faces 'protectionist' charges

Qatar Airways, Oman Air bosses accuse France and Germany of restricting access to airports in preference to flag carriers

Gulf airlines have upped their attack on European countries who allegedly restrict access to their main airports to protect their national carriers.

Speaking at a panel discussion at the Arab Air Carriers Organisation annual meeting in Dubai, outspoken Qatar Airways chief executive Akbar Al Baker accused Air France and Lufthansa of "stirring a protectionist approach" by Paris and Berlin.

"Europe is much worse than the US when it comes to protectionism," he says. "We have plenty of evidence to prove it."

Al Baker says an unwillingness by pilots and other employees to accept reform means these carriers are increasingly "inefficient" compared with Gulf rivals. He adds: "Their costs are skyrocketing and the unions are to be blamed."

There are "no problems" with access to the UK, he notes – British Airways is a fellow member of Oneworld. "The problems are in the Netherlands, France, Germany and elsewhere."

Paul Gregorowitsch, chief executive of Oman Air and a former Air France-KLM senior executive, says the French and German flag-carriers are "making life difficult" for the smaller Gulf airlines too. "We are restricted

from flying to [Paris] Charles de Gaulle because they are protecting Air France," he comments.

Emirates Airline boss Tim Clark struck a more sanguine note. "We do not want to force any country to do anything they don't want to do," he says. "Our job is to persuade people that we add value to the countries to which we fly. We hope that sense will prevail."

The Dubai airline operates to 38 destinations in the European Union, says Clark. "Etihad and Qatar are growing in the region too. I defy anyone to say that any of us have done anything to damage the economies of the countries we serve."

Last month, Association of European Airlines chief executive Athar Husain Khan vented his frustration over accusations that Europe operates in a protectionist way towards local carriers. He argued that Europe encourages open competition from overseas markets, and is calling for the same rules to be applied reciprocally.

"It's frustrating for me that the European airline industry is unjustifiably accused of being protectionist," he said.

"Europe is the only region in the world that has liberalised its market so far." ■



Qatar insists
it can prove
its claims

Rex Features

AIRSPACE

Gulf airlines call for ATM harmony

Qatar Airways chief Akbar Al Baker has described the failure of Gulf states to harmonise their airspace as an "accident waiting to happen".

Airlines have for years been urging governments to consolidate their systems for managing air traffic in upper airspace as the number of flights has grown, particularly into and out of the three main hubs of Dubai, Abu Dhabi and Doha. However, concerns over national security and territorial integrity have stymied reform.

Speaking in a panel discussion at the Arab Air Carriers Organisation annual gathering in Dubai, Al Baker said: "Restricting airspace is an accident waiting to happen as we [the Gulf carriers] grow". The current situation, where there are six flight

information regions (FIR) – traditionally one, in Bahrain, controlled much of the peninsula – is "causing congestion and bottlenecks and costing us millions in unnecessary fuel spend", he says.

His counterpart at Emirates Airline, Tim Clark, agrees that while the system of separate FIRs was a "threat to the environment and a threat to our economics", no carrier "will ever compromise on safety". He adds: "We will slow down, put aircraft in holding patterns, but you would never go over that red line [of taking safety risks]".

Clark says while Gulf governments could all see the benefits of consolidating airspace, "execution is the challenge". ■

PROCUREMENT CRAIG HOYLE LONDON

France commits to acquire 12 Airbus A330 MRTTs



Airbus Defence & Space

The first example will be delivered in 2018, replacing KC-135s

Paris has confirmed its selection of the Airbus A330 multi-role tanker transport (MRTT), with a dozen of the type to replace its current 14 Boeing C/KC-135s.

Announced on 20 November, the development will lead to the French air force receiving a first A330 MRTT in 2018 and a second in 2019, followed "at a rate of one or two per year", says the manufacturer. "The contract agreed between the French [DGA] procurement agency and Airbus Defence & Space is now

ready for official award."

France follows Australia, India, Qatar, Saudi Arabia, Singapore, the United Arab Emirates and the UK in selecting the type, with New Delhi and Doha both "in the final stages of contractual negotiations" for their planned respective buys of six and two of the aircraft.

The French air force's MRTTs will be the first to be produced in an improved next-generation standard, outlined by Airbus earlier this year. ■



David Learmount offers his succinct views on the complexities of aviation safety: flightglobal.com/Learmount

REGULATION JON HEMMERDINGER
WASHINGTON DC

FAA orders 777 pitch rate sensor inspections

A new airworthiness directive issued by the US Federal Aviation Administration requires Boeing 777 operators to inspect and potentially replace the aircraft's dual pitch rate sensors (PRSs).

The directive, which applies to 777-200LRs, -300s, -300ERs and 777 freighters, comes in response to reports received by the agency of dual failures of the sensors.

When both sensors fail, the aircraft's primary flight computer transitions from primary to secondary mode, which causes the autopilot to disengage, says the directive, made public by the US Office of the Federal Register on 19 November.

"We are issuing this AD to prevent a dual PRS failure that could cause an automatic disengagement of the autopilot and autoland," says the directive. ■

Suspension followed July 2013 fatal accident



ROUTES ELLIS TAYLOR SINGAPORE

Asiana challenges San Francisco ban

Asiana Airlines has lodged an appeal against its temporary suspension on the San Francisco route, which resulted from the crash of one of its Boeing 777-200ERs last year.

According to South Korean reports, Asiana has alleged that there were biases in the selection of the panel that imposed the 45-day suspension, and that the decision was reached in advance of the deliberation process.

It is understood that the penal-

ty, which was to have been served within six months of being handed down by the South Korean transport ministry on 14 November, will be stayed until the appeal is heard.

Asiana's suspension stemmed from the 6 July 2013 accident where one of its 777s crashed short of the runway at San Francisco International airport, hitting the airport seawall after its speed decayed to 103kt (191km/h). Two passengers died in the accident,

while a third who probably survived being ejected from the aircraft was killed after being hit by emergency response vehicles.

In June, the US National Transportation Safety Board concluded that the accident was ultimately caused by the crew's failure to manage the visual descent and delayed call for a go-around. It also cited crew fatigue and shortcomings with Asiana's training as having played a role in the mishap. ■

WIDEBODIES DAVID KAMINSKI-MORROW LONDON

Airbus relaxed over A330neo orders

Airframer sees no risk in fact that none of the 121 aircraft committed to by airlines in July has yet been added to its books

While yet to firm commitments to its A330neo, Airbus insists it is not facing uncertainty from initial customers.

Six customers have tentatively signed for a total of 121 A330neo jets but the orders, all of which were unveiled in July, have still

to be formally admitted to Airbus's backlog.

Speaking during a third-quarter results briefing, Airbus Group chief financial officer Harald Wilhelm said: "[We] don't see a big risk on these."

He says the A330neo had a

"very sound launch preparation" and that the airframer is confident about the aircraft's specifications and its own ability to re-engine the type.

The airframer is cutting the monthly production rate for A330s – from 10 to nine aircraft – from the fourth quarter of 2015.

Wilhelm says the decision was taken because the company "could not secure sufficient orders in time for 2015 deliveries".

Airbus Group's commercial aircraft earnings dipped by 3% in the third quarter, to €416 million (\$518 million), although revenues rose by 2%.

But its earnings remained up by 16%, at nearly €1.8 billion, at the nine-month point – partly the result of a higher number of A380s delivered.

It says the A380 is making



Pledges for 121 of the type were announced in July

"progress" towards breaking even at production level, a point Airbus aims to achieve next year.

Airbus expects overall deliveries this year to be "about the same level" as in 2013, when it handed over 626 aircraft. Its book-to-bill ratio was already above unity at the end of September, although the airframer was still lagging 2013 deliveries by the beginning of November. ■

NARROWBODIES MAVIS TOH SINGAPORE

Eva seeks more than 40 jets next year

Eva Air says it will need to make an order for more than 40 next generation aircraft in 2015, for its short- and medium-haul needs.

Speaking to Flightglobal on the sidelines of the Association of Asia Pacific Airlines' assembly of presidents in Tokyo, Eva's executive vice president of corporate planning Glenn Chai says the airline needs to make a decision for at least 30 nar-

rowbody aircraft next year.

The Airbus A321 operator is deciding between the Airbus A320neo and the Boeing 737 Max, he adds.

The Taiwanese carrier is also evaluating the Boeing 787-10 and the A330neo for its medium-haul needs.

Chai says Eva had thought the 787-10 "ideal" for its requirements, until Airbus launched the A330neo in July. ■



CFM flight testing
takes double Leap
AIR TRANSPORT P12

MARKETING MAX KINGSLEY-JONES NASSAU

Max 'right size' for Avianca

Airbus rival insists 737 variant is a contender in battle to switch carrier's allegiance

Boeing is confident it can oust Airbus at Latin American airline group Avianca, despite the large incumbent fleet of A320-family aircraft and orders for A320neos.

The Bogota, Colombia-based airline group and its affiliates operate around 150 A320-family aircraft. It was among the launch customers for the A320neo family and has 33 on order, but Boeing's head of sales for the region is bullish about Seattle's prospects at the airline.

"We're working on a campaign right now to introduce the Max there," says Van Rex Gallard, Boeing's vice-president of sales for Latin America, Africa and the Caribbean. "They have [ordered A320neos], but when we show the numbers to their fleet planners, the 737 Max 8 – which is the heart of the fleet when it comes to size – is



Colombia-based airline was a launch customer for the A320neo

the right size for Avianca and has better economics than brand A.

"If you're pragmatic... and even taking in to consideration the cost of introducing a new fleet type, the Max 8 is a better solution for Avianca on that size of airplane." Despite the challenge of engineer-

ing a major switch in allegiance, Gallard believes Avianca can be a serious 737 Max prospect.

"It's not a done deal – we're in the middle of the conversations. But I'm bullish enough... about the fact that we have a good chance there." ■

PURCHASING
TOM ZAITSEV MOSCOW

Ural Airlines puts widebody plans on hold

Russia's Ural Airlines has put plans to acquire widebody airliners on the backburner, citing a decline in demand for long-haul services.

The Ekaterinburg-based carrier operates an all Airbus fleet of 34 narrowbodies. Last year it outlined plans to make a choice between Airbus and Boeing twin-aisle types by 2015.

But general manager Sergei Skuratov says it has pushed back this plan because of decreased demand for travel abroad in 2014.

"We considered deploying widebodies on long-haul charter services to foreign destinations," he explains. "However, traffic in this segment has fallen by 17% this year." ■



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RENEWALS DAVID KAMINSKI-MORROW DUBAI

Kuwait Airways approves \$3.3bn modernisation

Kuwait Airways intends to buy 10 Boeing 777-300ERs as part of a fleet-renewal programme.

Modernisation of the Kuwaiti flag-carrier's fleet is a key step in the government's drawn-out plans to privatise the airline.

Kuwait Airways managing director Rasha Al Roumi told Flightglobal, during the Arab Air Carriers Organization conference in Dubai, that the 777 agreement would be signed "shortly".

Her comments were followed on 20 November by a statement issued by Boeing, in which the airframer described the pending deal as "worth \$3.3 billion at current list prices".

Al Roumi says the carrier's older aircraft – notably its Airbus A300s,

A310s and A340s – are generating "very high" costs in terms of maintenance and fuel. The airline has already ordered a batch of A350-900s and A320neos to expand and upgrade its capacity.

With the new fleet the company will undergo further evaluation as a step towards privatisation. The carrier is cutting staff – from around 6,000 to 5,000 – as part of the preparation, says Al Roumi. ■



Older types such as the Airbus A340 have proven too costly to run

DELIVERIES DAVID KAMINSKI-MORROW DUBAI

RAM to seek regional jets in broad fleet expansion

Royal Air Maroc is intending to seek a batch of new aircraft from next year with the aim of doubling its fleet to 105 by 2025.

The airline has four Boeing 767s for long-haul operations but will take the first of five 787s in December, with the second arriving in March next year.

RAM senior vice-president Habiba Laklalech told Flightglobal, at the

Arab Air Carriers Organisation conference in Dubai, that the 787s would initially be used for "reinforcing" key routes to New York, Montreal and Sao Paulo.

She says that the airline will "probably keep" the 767s by extending leasing agreements.

RAM will also raise capacity towards the end of this year through the introduction of four Embraer 190s.

Laklalech says the airline, which already has five ATR turboprops, is interested in using the regional jets to "help open new routes".

RAM's broader fleet-expansion programme will provide the airline with 85 medium-haul aircraft by 2025, of which around 25 will be 100-seat jets. The carrier currently uses 36 Boeing 737s for medium-haul services. ■

Modernisation... is a key step in... plans to privatise the airline



PROPULSION MAX KINGSLEY-JONES NASSAU

CFM flight testing takes double Leap

Engine maker lauds “promising” results from initial trials as it readies second flying testbed, aiming for mid-2015 certification

CFM International describes early flight-test results of the new Leap turbofan as “promising” as it plans parallel flight trials using a second Boeing 747 flying testbed (FTB).

The Leap-1C engine made its first flight on a Boeing 747-100 FTB on 6 October from Victorville, California, and has completed around 75h of flight-testing so far. This version will power China’s Comac C919 twinjet, but is very similar in configuration to the Airbus A320neo’s Leap-1A.

“In terms of flight-test, the two engines are similar and have the same fan size. The main difference is the way we integrate the engines into the aircraft,” says CFM president and chief executive Jean-Paul Ebanga.

Speaking to Flightglobal at the ALTA Airline Leaders Forum in Nassau, Ebanga said the early results from flight testing have been “promising”.

He adds: “Frankly speaking, the flight-test programme is



Airborne trials of the Leap-1C on a Boeing 747 began in October

going very well. We have two flying testbeds – a 747-100 and a -400 – to be able to fly the -1C and -1A in parallel.”

Although the Leap-1C is the first to fly, the A320neo’s Leap-1A will be the first engine certificated and delivered. Testing of the Leap-1A is to be undertaken on the 747-400 FTB, says Ebanga. “As we are flying the -1C, all the results are usable on the -1A,” he adds.

Leap flight-testing began around five months later than originally scheduled but Ebanga says this should not be viewed as a slip: “You need to take a holistic view of the situation. We have to perform a series of tests – some being engineering testing and some certification testing.

“We need to meet fixed milestones which are our commitment to support the entry into service of the aircraft. What we

are doing is a rolling optimisation of the test plan,” he adds. “In terms of the real milestones, which are the certification date and entry-into-service date, we are still working to deliver our engines at those dates.”

CFM is not revealing the size of the Leap flight-test programme or its precise target date for certification, beyond saying it will be mid-2015.

“We don’t want to communicate on the firm certification date because we are not the one who certifies the engine, it is the agencies. And CFM is the only engine certificated by the US FAA and EASA at the same time,” says Ebanga.

The Leap-powered A320neo is due to enter service “roughly a year” after certification, and CFM says it is working closely with Airbus to ensure that the first series-production Leap-1As will arrive on schedule, adds Ebanga. “We are already starting to produce the first parts for the serial engines.” ■

DEVELOPMENT DAVID KAMINSKI-MORROW LONDON

Irkut targets delivery of first four MC-21s by 2018

Irkut is aiming to hand over the first four MC-21 aircraft to customers in 2018, following certification of the twin-engined type at the end of 2017.

Russian trade minister Denis

Manturov says that the first flight of the aircraft will take place in the first half of 2016.

Deputy prime minister Dmitry Rogozin told a governmental panel in September that the air-

craft would conduct its maiden flight in April of that year.

He also reiterated that the aircraft would enter service under the name Yak-242.

Rogozin said that the 180-seat MC-21-300 was the variant “most in demand”. Irkut is also planning a -200 with 150 seats but has cooled on producing a larger version.

Although Irkut has selected Pratt & Whitney PW1400G engines for the type, Rogozin told the panel that the fourth example would be fitted with Russian-built Aviadvigatel PD-14 engines, which were in the process of being integrated into the aircraft design.

During a visit to the Irkut aviation facility on 14 November,

Manturov stated that the assembly line would be completed in late May next year, and initial flight-test and static airframes would be assembled by the end of 2015.

“The entire programme for the MC-21 is being carried out on schedule,” he claims, adding that the company has been “actively replacing” imported materials and systems with domestically-produced equivalents.

Using the PD-14 powerplant would raise the Russian contribution to the aircraft to more than 50%, he says, increasing to 60% once serial manufacture starts.

Irkut claims orders for 175 MC-21s including 50 for Aeroflot. “Interest in the purchase of these aircraft is high,” says Manturov. ■



The Russian narrowbody’s first flight is due in the first half of 2016



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REGIONALS MAX KINGSLEY-JONES NASSAU

SJI's offensive on Western front

Marketing organisation for Russian-built Superjet advances on Embraer's E-Jets with discount leasing deals

SuperJet International (SJI) has launched a drive to capture a share of Western markets for the Sukhoi Superjet 100 by offering cut-price lease deals in an effort to counter its rival Embraer.

Mexican low-cost carrier Interjet is the only Western customer SJI has announced so far for the 100-seat regional jet. However, with the validation of the airline's early in-service experience combined with an aggressive sales campaign and claimed lower operating costs, SJI chief executive Nazario Cauceglia is extremely bullish that the Superjet can compete strongly against the current Embraer E-Jet family and the upgraded, Pratt & Whitney geared turbofan-powered E-Jet E2.

"We know that the competition is fierce," says Cauceglia. "We are a newcomer so we must be able to offer everything we can to make our proposal more attractive."

He claims the Superjet offers 10% better cash operating costs



over the current Embraer E-Jet direct competitor, "and most likely – even without doing anything – we would be able to compete with the E2".

"To keep a certain amount of gain we have decided to keep improving our aircraft. That's why we are confident when the E2 comes we will have an aircraft with the same performance," he says.

He says the unproven nature of the SSJ means it cannot yet rely on "attractive residual value data", so SJI has put together "very attractive operating lease proposals", which include turnkey maintenance support, to increase the financial appeal of the aircraft.

SJI is currently bidding in four campaigns, says Cauceglia, but declines to name the airlines in-

involved. However, he notes the strategic importance of a recent deal between Belgian carrier VLM and Russian lessor Ilyushin Finance for the lease of an initial two Superjets next year.

"Finally our aircraft will be operated in Europe. This is extremely important and I'm sure it can open the door to other, bigger deals," he says. ■

FLEETS MARK PILLING ZHUHAI

China Express considering CSeries

Fast-growing regional carrier China Express Airlines has confirmed its strong interest in adding the Bombardier CSeries to its fleet, after giving the Canadian manufacturer's CRJ900 programme a major boost in the run up to Airshow China in Zhuhai with an order for 24 of the type.

"We have been in talks with Bombardier since the second half of 2014 about the possibility of

introducing the CSeries into the China Express portfolio," said airline president Wu Longjiang, speaking to *Flight International* at the biennial Chinese show.

The eight-year-old privately-owned carrier is also evaluating the Comac C919, Airbus A320 and Boeing 737 families, but is focusing on its regional operations, where the size of the CSeries family in the 100-149-

seat range appears more favourable. "In two or three years we will see which routes have matured where either frequency increases or traffic demand could see us using a bigger jet in place of the CRJ900," Wu says.

China Express, which operates four 50-seat CRJ200s and 11 84-seat CRJ900s, was revealed as the unidentified customer on Bombardier's books dating back to June for 16 firm CRJ900 orders plus 8 options. The \$727 million deal was announced on the occasion of the Asia-Pacific Economic Co-operation forum in Beijing on 8 November, at an event attended by Chinese premier Li Keqiang and Canadian prime minister Stephen Harper.

The carrier's CRJ900s will be delivered from 2015 through to 2018, Wu says. ■

MAINTENANCE

First Emirates A380 overhaul completed

Emirates has completed the first overhaul of an aircraft in its Airbus A380 fleet.

The heavy maintenance was conducted on the Gulf carrier's first A380 – MSN011, registration A6-EDA – which was assembled in 2007 and delivered the following year. Flightglobal's Ascend Fleets database shows the aircraft had accumulated around 25,400 flight hours and 3,100 cycles by the end of August.

The maintenance overhaul took nearly eight weeks, with technicians working on the aircraft round the clock. The removal of around 1,600 interior items – including seats, galleys, bars, shower rooms and parts of the cockpit – took 12 days. ■



The regional carrier has 16 firm CRJ900 orders, plus 8 options

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LITIGATION DAN PARSONS WASHINGTON DC

BAE hits back in F-16 upgrade spat

Company seeks to block demand for \$43 million payment after Seoul backs out of deal to modernise 134 fighters

BAE Systems has filed a lawsuit in a US district court in an attempt to avoid a \$43 million payment claim by South Korea's military purchasing agency, following Seoul's 5 November cancellation of a deal to upgrade 134 of its Lockheed Martin F-16 fighters.

The termination decision followed a period of price haggling between BAE, South Korea's Defense Acquisition Program Administration (DAPA) and the US government that is outlined in the company's lawsuit.

In August, the US government "informed South Korea that the overall price of the upgrade programme could increase by as much as \$800 million", to between \$2.4 billion and \$2.5 billion, alleges the suit, which was filed on 12 November in a US District Court in Maryland.

BAE alleges that South Korea killed the deal because the company failed to secure a sufficiently low price through the US Foreign Military Sales (FMS) process for the modernisation work, which was to include installing new avionics and an active electronic scanned array radar produced by Raytheon. One single-seat F-16C

and one twin-seat trainer had already received the upgrade in Fort Worth, Texas.

Despite the amount of the potential price increase, BAE alleges Seoul backed out of the deal because the company was not able to talk down the US government, which oversaw the FMS contract.

"Clearly disappointed by the progress of its discussions with the US government, in early November South Korea instructed the US Air Force to cancel the selection of BAE," the suit says. The company is not seeking to reinstate the award.

In April, BAE had provided the DAPA with a guarantee for a payment of \$43.2 million if it failed to take certain actions during the bid phase of the upgrade programme; "a phase now long completed", the lawsuit says.

"DAPA is now impermissibly seeking to require BAE to pay \$43,250,000 under the April 2014 letter of guarantee," it continues. BAE claims South Korea blames the company not for violation of the initial agreement, but for its "inability to force the US government to withdraw its proposed price increases". ■



Three of Brussels' aircraft were at the delivery event in France

ROTORCRAFT DOMINIC PERRY LONDON

Belgium receives last of its NH90 transports

The Belgian military has taken delivery of its last of four NH Industries (NHI) NH90s in the TTH troop transport variant.

Handed over on 13 November at the Marignane production facility of NHI majority shareholder Airbus Helicopters, the rotorcraft will be based at Beauvechain air base near Brussels.

The NH90 was joined at the delivery event by two of Belgium's earlier aircraft, which had been participating in a training exercise in southwest France.

The Belgian Air Component's 1st Wing now has all four of its 10.6t transports. It also has received two of an eventual four NFH naval variant NH90s, with

the third due to be handed over on 25 November, and the final example to follow early in 2015.

So far, Belgium's Turbomeca RTM322-powered NH90s have logged 450 flight hours, with an availability rate of around 70%.

"The delivery of this NH90 TTH is the result of a very good co-operation between industry and the Belgian defence forces," says NHI president Vincent Dubrule.

Belgium's latest aircraft is the 217th NH90 to have been delivered, including 38 so far this year.

NHI says its partner companies remain on track to hand over around 52 of the rotorcraft during 2014. ■

PROGRAMME GREG WALDRON SINGAPORE

LCH testing gathers pace, but delivery date slips



Aircraft TD-3 performed a 'flawless' 20min debut flight, HAL says

Hindustan Aeronautics (HAL) performed a "flawless" 20min debut flight with the third test example of its light combat helicopter (LCH) from Bengaluru on 12 November.

Aircraft TD-3 follows two earlier test platforms, which have so far accumulated a combined 285h in 388 flights since March 2010. Along with a fourth airframe, it will be used to participate in cold- and hot-weather trials, as well as weapons testing.

HAL chairman RK Tyagi says the LCH will be "an effective weapon platform to deliver precision strikes at high altitude, and we are confident it will meet the requirements of the Indian air force. We are making all efforts to achieve initial operating capability by September next year," he adds.

In 2011, HAL said deliveries would commence in 2013-2014, but gave no reasons for the delay. It expects to produce 179 of the 5.8t type for the Indian military. ■



US Marines may
turn to Reaper for
longer-range UAS
DEFENCE P18

PROCUREMENT BETH STEVENSON LONDON

Nigeria tempted by Scorpion's sting

Aircraft that could carry precision munitions would assist in fight against insurgent group Boko Haram, air force says

Nigeria's air force has expressed an interest in acquiring the Textron AirLand Scorpion strike and surveillance aircraft in order to counter the Boko Haram Islamist insurgency in the country.

The service currently operates the Chengdu F-7NI and ATR 42 in the respective dedicated strike and surveillance roles, but believes that a low-cost aircraft with a dual capability would enable quicker and more precise counter-insurgency operations.

"In my country, we want and need this," director of operations Air Vice-Marshal RA Ojuawo told the IQPC International Fighter conference in London on 18 November. "We want this equipment, but are they going to give it to us?"

Ojuawo says Abuja will soon put in a request to the US government for up to a squadron's worth of aircraft. However, it worries that approval may not be granted, based on the previous rejection of

its interest in Bell Helicopter AH-1 Cobra rotorcraft.

"It is going to take the international community to fight insurgency, and the only way to do that is to give [countries] the technology that they need," Ojuawo says.

Nigeria's current 10 F-7 combat aircraft are unable to carry precision-guided munitions, making them poorly suited for performing counter-insurgency strikes in urban environments.

"We are really handicapped in targeting the enemy where they are," Ojuawo says. Equally, its two unarmed ATR turboprops can be used to detect insurgents, but there is a delay before strike aircraft can be brought on station.

"The ATR will see the enemy, know its position, but can't do anything about it," he says. "We have to fight the way the enemy is fighting and find him where he is. We as a nation and as an air force are having a rethink." ■



Textron AirLand

Precision-guided munitions would be used during urban warfare

SUPPLIERS STEPHEN TRIMBLE WASHINGTON DC

Honeywell chosen to produce engine

Textron AirLand has started making supplier selections ahead of the production phase of its Scorpion light attack and reconnaissance aircraft.

A formal launch depends on signing a first order, but Textron AirLand has already selected Honeywell to deliver its TFE731-40AR-3S turbofan engines, which already power the company's prototype of the developmental twinjet.

Speaking in September, Textron Aviation chief executive Scott Ernest

said a launch order could be announced by the end of this year, and referred to "several interested parties outside the United States".

Textron AirLand developed the Scorpion in secret for two years before unveiling its prototype in September 2013.

The aircraft has now accumulated more than 200 flight hours, and recently appeared at the US Air Force Association's annual convention near Washington DC. ■

PRODUCTION DOMINIC PERRY LONDON

Airbus misses A400M capability clearance target

Airbus Defence & Space still aims to deliver as many as 10 A400M transports this year, but has acknowledged missing a significant milestone to introduce a package of expanded tactical capabilities.

Speaking on 14 November, Airbus Group chief financial officer Harald Wilhelm said that although the company is confident of hitting its 2014 production target, the "profile of deliveries is obviously not smooth".

Wilhelm describes the customer acceptance process as "painful", but says Airbus must acknowledge "that we did not achieve all the capabilities in time". Any shortfalls are expected to be delivered by mid-2015, the company adds.

The A400M had been due to attain its standard operating



Peter Foster

Turkey has received one of the tactical transports this year

capability 1.0 clearance no later than 1 November, bringing new functionality, including basic airdrop. Airbus's failure to meet this schedule triggered a contract clause which could enable Belgium, France, Germany, Luxembourg, Spain, Turkey and

the UK to cancel their orders. Wilhelm notes that the nations – working through Europe's OCCAR defence procurement body – would have to agree "unanimously" to terminate their combined 170 orders: a situation he sees as "unlikely".

Airbus continues to work towards introducing progressive enhancements on the A400M, says Wilhelm, with aerial delivery, in-flight refuelling and self-protection "the key capabilities in the course of the next year". At the same time, it will continue with deliveries and its "industrial ramp-up", which he concedes is "not the most cost-efficient way to do this", due to the need for subsequent retrofit programmes.

France has taken delivery of three of its expected five A400Ms for 2014, while Turkey has received one. The UK's first of three scheduled examples touched down at the Royal Air Force's Brize Norton base on 17 November, while Germany's lead aircraft will also be handed over before year-end. ■

EQUIPMENT

New sensors for
Italian MQ-9 fleet

Italy is acquiring Rafael Reccelite reconnaissance pods for its unarmed General Atomics Aeronautical Systems MQ-9 Reaper unmanned air vehicles, and also has its sights set on adding the Selex ES Seaspray 7500E radar.

Reccelite should reach full operational capability with the Italian air force's Reapers in 2016, its MQ-1 and MQ-9 programme office deputy lead Lt Col Lorenzo Rispoli told SMI's Unmanned Aerial Systems conference in London. "Then we will work on the integration of the Seaspray 7500E radar to have it on board for surveillance," he says. "Technically, we are ready to start the [radar] programme, but we are waiting for the budget approval."

The air force is also considering increasing the size of its fleet of Reapers, which are operating at full capability ahead of being withdrawn from Afghanistan in the coming months. ■

**Rafael Reccelite pods
could be followed by
Seaspray radar units**

OPERATION BETH STEVENSON LONDON

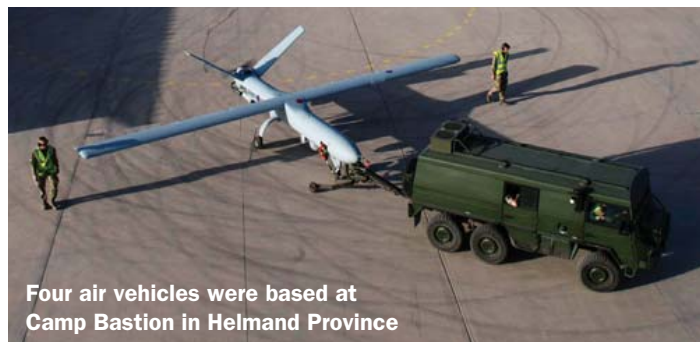
Watchkeeper performance
praised by British military

In first deployment, WK450 provided force protection and guided air strike in Afghanistan

The first deployment of the British Army's Elbit Systems/Thales Watchkeeper unmanned air system in Afghanistan included providing cueing and intelligence to the UK Royal Air Force and US Marine Corps, the service says.

One system, consisting of four WK450 aircraft, was deployed to Camp Bastion in Helmand Province in August and used to provide wide-area surveillance for British troops being withdrawing from the country, says Lt Col Craig Palmer, commanding officer, UAS branch leader at 32 Regt Royal Artillery.

A first Watchkeeper flight took place on 2 September, followed two weeks later by the first operational sortie. During the latter, information from the aircraft's Thales I-Master radar was provided to the USMC, and also used to cue a British Army-operated Elbit Hermes 450 to enable continued surveillance. Its infor-



Four air vehicles were based at
Camp Bastion in Helmand Province

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mation was then passed on so that one of the RAF's General Atomics Aeronautical Systems MQ-9 Reapers could conduct a strike mission.

"The US Marine Corps were pretty delighted with that," Palmer says.

Some 140 flight hours of a part-Watchkeeper capability had been accumulated by the time operations ceased in mid-October, Palmer told SMI's Unmanned Aerial Systems conference in London. WK450s were flown for

about 8h each day, he adds.

The I-Master's synthetic aperture radar and ground moving target indication capability was "the game-changer" which led to the new type being deployed so late in the conflict, Palmer says. While praising the first version, he adds that "we believe we've only just scratched the surface".

The British Army expects to achieve full operational capability with Watchkeeper in 2017.

"We're now into the Watchkeeper era," says Palmer. ■

PROCUREMENT DAN PARSONS WASHINGTON DC

US Marine Corps in market for Reaper-sized UAS

Changes to the US Marine Corps' shipboard aircraft fleet have put it in the market for a larger unmanned air system than the small tactical and hand-launched types that it has so far largely relied on.

The service's Marine Aviation Plan 2015 is the first document to mention a requirement for a medium- to high-altitude, long-endurance UAS.

Beginning in fiscal year 2016, the USMC will gradually retire

its 20 Northrop Grumman EA-6B Prowler electronic warfare aircraft. The service intends to replace these via its Marine Air-Ground Task Force Electronic Warfare operational concept, with a key requirement being to offload at least some of the mission to larger, longer-range UAS, says Doug Hardison, General Atomics Aeronautical Systems' strategic development manager for US Navy and Marine Corps programmes.

A capability assessment is ongoing, with officials confirming that a programme of record for an "MQ-X" system was established in FY2014.

Introduction of the Bell Boeing MV-22 Osprey tiltrotor has also

created a need for new unmanned intelligence, surveillance and reconnaissance systems.

"They envision a larger UAS that's got the long endurance, long range, that is a truck where you can change out and upgrade payloads quickly, and you are now in a position to support all the other new equipment in Marine aviation," says Hardison.

General Atomics plans to offer a UAS that can access any airfield suitable for a Lockheed Martin KC-130, and has already worked with the US Air Force to modify the MQ-9, including increasing its engine power, says Hardison.

"The residual benefit of that is we have a capability that is more expeditionary," he says. ■



US Air Force

General Atomics has optimised the type for the US Air Force

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FACILITIES BETH STEVENSON LLANBEDR

UAV testing to get Welsh lift

With its 2,300m runway, the former RAF Llanbedr has room to serve as a base for a wide range of unmanned operations

Wales's experience in testing unmanned air vehicles has been taken to the next level, with Llanbedr Airfield being awarded initial operational capability status for UAV test flights.

Llanbedr Airfield Estates (LAE) is running the site under a 125-year lease from the Welsh government and subsequently signed a deal with Qinetiq to manage the scheduled remotely piloted air systems (RPAS) operations. This is based on the latter's experience in managing the ParcAberporth UAV testing site situated further down the coast in Cardigan Bay, which is the home to flight testing of the British Army's new Thales UK/Elbit Systems Watchkeeper unmanned air system.

AIRSPACE

Qinetiq and LAE say that the runway at Llanbedr – at about 2,290m (7,500ft) – is longer than the one at Aberporth and can facilitate testing of the whole spectrum of UAV sizes.

Llanbedr Airfield – a former UK Royal Air Force target-practice site – is situated to the east of the overseas D201 danger area established by the UK Civil Aviation Authority, which also connects to the overland D202 range to the south. Access to this from Llanbedr will be established through a flight corridor that the team says it is ready to propose to the CAA when the first UAV operator requests it.

A proposed temporary danger-zone certification would allow UAV flight at Llanbedr in an area up to 5nm (9.3km) in diameter and to an altitude of 6,000ft over the airfield. A 10nm-wide corridor adjoining D201 at two varying levels – from the surface to 6,000ft, and between 3,000ft and 6,000ft – will allow other air traffic movements above and below, according to Qinetiq.



Qinetiq was chosen to manage RPAS activity at the airfield

Daytime flights will be permitted on a campaign basis, which upon authorisation would include up to 90 days of operations – not necessarily consecutively or for the same system – with a 90-day notice period to allow access out to the test ranges.

Qinetiq expects that when the airfield's UAV activities are ramped up to full operational capability, the team will apply to the CAA for an "airspace change proposal". This would take two years to be put in place but would effectively allow access to the ranges to be more permanent.

"There is a master plan for the airfield site," Jeremy Howitt, programme director for UAS future business and strategy at Qinetiq, says. "There is an acceleration in RPAS programmes, especially for larger systems, and for the test and evaluation of these systems. We could accommodate pretty much every UAV on the market."

Howitt says the team is taking a step-by-step approach to the integration of UAVs into the test site, which will also allow for some manned flights. There are a number of programmes lined up for 2015, he adds. Qinetiq is currently in discussions with the

UK Ministry of Defence regarding potential testing at Llanbedr, and is planning on carrying out some UK and European airspace integration testing, he notes: "If customers want to fly in Europe – and they do – and they want the infrastructure in place, then Llanbedr is on the map."

PROGRAMMES

Qinetiq is involved in the UK's Autonomous Systems Technology Related Airborne Evaluation & Assessment (ASTRAEA) programme, which aims to establish the technology and regulations for UAVs to be regularly flown in national airspace.

ASTRAEA phase 3B brings

testing of different technologies within UK airspace, Howitt says: "For 3B, the bid is in...and we're confident that we'll get the green light and will start it from next summer out to 2018."

Qinetiq is to lease the UMS Group F-720 tactical UAV to carry out ASTRAEA testing. It is expected to be delivered to Llanbedr within 12 months.

The F-720 can also carry the Selex ES Seaspray 5000E radar, which will enable Qinetiq to carry out some maritime surveillance testing.

The ultimate aim for this 3B phase is for the company to demonstrate the F-720 flying through the flight corridor, out into D201, over the Irish Sea and on to land at an airport with routine air traffic.

Through the European Space Agency's Desire project, Qinetiq will also demonstrate the F-720 with an Airbus Defence & Space Ku-band satellite communications payload. It could also look to bid for Single European Sky air traffic management projects that may emerge, Howitt says.

The vision does not stop at UAVs though, with Llanbedr also being among eight finalists that could host a future UK spaceport. A choice is expected by 2018, with the Llanbedr team now assessing ways to extend the runway to 3,060m, as required for the effort. ■



The UMS Group's F-720 will support the ASTRAEA programme



Regionals'
growth potential
NEWS FOCUS P23

CHARTER KATE SARSFIELD LONDON

AJA hails air taxi potential

Abu Dhabi-based company says its Sky Limo will be first service of its kind in Middle East

VIP business aircraft services provider Al Jaber Aviation (AJA) is gearing up to launch the Middle East's first point-to-point, branded air taxi service in early December and hopes to expand the operation into Europe within the next 18 months.

The service is called Sky Limo to reflect Abu Dhabi-headquartered AJA's high level of bespoke customer service and to draw a distinction between the low-frills, low-cost service synonymous with traditional air taxi operations.

"We have been looking to launch this service for some time," says Mark Pierotti, chief operating officer of the Al Bateen airport-based company, which operates a growing fleet of VIP-configured business jets, including two Embraer Lineage 1000s and an Airbus ACJ318.

"The opportunity came our way two months ago when an owner of a Hawker 800XP – registration A6-GAL – wanted to find a partner to do something with their aircraft."

Sky Limo is targeted at executives who are looking to do short, regional hops without the expense of larger-cabin, longer-range jets.

"Many senior executives are looking to make day trips around the region for business – Bahrain



The firm will start with a Hawker 800XP and build from there

to Baghdad, or Kuwait to Istanbul, for example – and this ad hoc, point-to-point, service-focused offering is simply not possible with the airlines," Pierotti says.

AMBITIONS

He suggests travellers are becoming increasingly sophisticated and are prepared to seek out the best mode of transport for their needs.

"With Sky Limo, there are no schedules. It fits around the customer's timetable. It is a great concept. Air taxi's time has come," he adds.

AJA admits the launch costs for Sky Limo are high and the service is not expected to generate a large profit for the company. This, however, does not appear to be a concern for Pierotti.

"Not only does Sky Limo expand our service offering for existing customers, it should also

help to attract new business by lowering the entry barrier to private aircraft travel," he says.

Sky Limo will add a second 800XP next year, and AJA is also hoping to introduce managed Embraer Phenom 300s to the fleet as soon as the opportunity arises. "These high-performance light business jets will get in and out of most airports in the Middle East," Pierotti says. "By the end of the decade we hope to have 10 aircraft – light and midsize business jets – in the Sky Limo inventory," he continues.

The five-year-old company is also looking to expand the service to Europe within the next 18 months with "placement partners" in key destinations such as Malta, Greece and Switzerland. "Our plan is to have a suite of [strategically placed] aircraft on call," says Pierotti. ■

DELIVERY
KATE SARSFIELD LONDON

G650ER set for delivery ahead of schedule

Gulfstream has delivered the first fully outfitted G650ER months ahead of schedule and is gearing up to hand over the first all-new version of the ultra-long-range business jet before year-end. The airframer originally planned to begin shipments in 2015.

"It's a good day when you can deliver on your promises ahead of schedule," says Gulfstream president Larry Flynn.

The handover to an undisclosed customer comes a month after the US Federal Aviation Administration certificated the extended-range version of its \$64.5 million G650, which entered service two years ago – and six months after the longest-legged, in-production business jet was unveiled.

**"It's a good day
when you can deliver
on your promises
ahead of schedule"**

LARRY FLYNN
President, Gulfstream

The Savannah, Georgia-based company added 1,810kg (4,000lb) of fuel weight to enable the \$66.5 million G650ER to fly up to 7,500nm (13,900km) at Mach 0.85 – 500nm more than its stablemate. This extra range allows the aircraft to connect to a greater number of city pairs, including Hong Kong to New York nonstop. Both models have a top speed of Mach 0.925.

Its closest rivals are Bombardier's in-development Global 7000 and 8000, which are projected to have a range of 7,300nm and 7,900nm when they enter service in 2016 and 2017, respectively.

The Rolls-Royce BR725-powered G650ER differs from the baseline model only by software changes to the fuel-metering and flight-management systems.

The ER retrofit is priced at \$2 million. ■

PRODUCTION KATE SARSFIELD LONDON

Dassault 8X on pace for 2015 flight

Dassault is preparing to roll out the first Falcon 8X on 17 December at its Bordeaux-Mérignac facility in France and says the ultra-long-range business jet remains on track for first flight early next year.

This aircraft will be dedicated to flight envelope expansion, while a second 8X – now under construction and scheduled to fly in the second quarter of 2015 – will focus on performance. A third fully conforming aircraft

will help with cabin systems and preparation for entry into service.

The 19-seat tri-jet was unveiled in May. It is a stretched and longer-legged version of the 7X – of which more than 250 models have been built since its launch in 2007.

The 8X sits at the helm of the six-strong high-end Falcon business jet family, whose entry-level product is the 3,350nm (6,200km)-range super-midsize 2000S. The flagship aircraft has a range of

6,450nm – 500nm more than the 7X – and features more powerful Pratt & Whitney Canada PW307D engines and a redesigned ultra-efficient wing derived from its stablemate.

The 8X also has a 13m (42.6ft) cabin featuring up to 30 interior configurations.

Certification of the \$57 million business jet is scheduled for the middle of 2016, leading to first deliveries in the second half of the year. ■



Lufthansa has signed a firm order for 30 CSeries jets for subsidiary Swiss



Bombardier

MILESTONE STEPHEN TRIMBLE WASHINGTON DC

First CS300 breaks cover

135-seat narrowbody spotted testing fuel flow systems, as reshuffled Bombardier prepares for new wave of interest

On 16 November, the first Bombardier CS300 was spotted outside the factory for the first time. The stretched CSeries model is still within days or weeks of entering pre-flight taxi tests, but emerged to perform a battery of checks on its fuel flow system.

This particular CS300 is the sixth CSeries aircraft to enter final assembly, and the fifth to emerge from the factory in Mirabel, Canada. Four smaller CS100s have already entered flight testing, while a fifth remains in final assembly.

Bombardier says it still plans to complete first flight with the CS300 by the end of the year, “weather permitting”.

STOPPAGES

As it enters the flight test programme, the first CS300 will be operated by a commercial aviation division almost unrecognisable from the organisation that celebrated first flight of the CS100 just 14 months ago.

The scars of the first year of CS100 flight tests are still fresh. The test programme has suffered several stoppages, including a

100-day hiatus caused by the failure of a Pratt & Whitney PW1500G engine on the ground on 29 May.

In the same year that the Airbus A350-900 and Boeing 787-9 racked up thousands of hours of flight testing, the CSeries managed only about 300. The completed tests were also compromised by the fly-by-wire system, which activated normal mode for the first time only during October.

Amid slow progress on the flight test schedule, Bombardier’s management also went through upheaval. The Bombardier Aerospace segment is being dissolved into three standalone units, even as the company sheds thousands of administrative and management staff.

After such a year, it may seem that the only direction the company can move is up – and the CS300 is to become a symbol of a new sense of momentum introduced by a reorganised global sales team, led by new executive Ross Mitchell.

In August, Mitchell was given responsibility for an organisation that combines communications, public relations, product marketing, sales operations, deal management and strategy. In early November, Bombar-

“I would expect it to get more action, and attention does drive some customer behaviours”

ROSS MITCHELL
Bombardier

dier’s asset management, which oversees trade-ins and used aircraft, was added to his portfolio.

“It’s a compilation of all the internal functions that are part of the sales process,” Mitchell says in an interview with *Flight International*. “They are all combined to work toward the single goal to ensure we are selling aircraft and doing what’s best for our customers.”

Bombardier’s CSeries sales record seems modest, with a firm order backlog of 243 aircraft, including 180 CS300s and 63 CS100s. However, the modest appearance reflects the scale of narrowbody rivals Airbus and Boeing, which have thousands of backlogged orders for mostly larger aircraft. Bombardier has always maintained a goal of achieving 300 combined firm orders for the CSeries family by entry into service of the CS100 in the second half of next year.

The beginning of flight tests for the 135-seat CS300 is expected to drive a new wave of interest for

what should be the most popular model in the family. “I would expect it to get more action, and attention does drive some customer behaviours,” Mitchell says.

POSSIBLE BUYER

Lufthansa subsidiary Austrian Airlines has been named a possible buyer for 16 CSeries aircraft in the near-term. Lufthansa has already signed a firm order for 30 CSeries for subsidiary Swiss – and that order includes options.

“With Austrian being a part of the Lufthansa group, there are certainly options available,” Mitchell says. “The fact that those options exist leaves us well positioned for further business in the Lufthansa group.”

Unlike Airbus and Boeing’s vast narrowbody assembly operations, Bombardier is starting up the CSeries lines from scratch in a factory still being erected in Mirabel. As a result, customers have to be willing to wait longer to receive their aircraft.

“We have pretty full skylines at this point,” Mitchell says. “Early deliveries wouldn’t be easy to come by now. I think we’ve had demand that has filled up early positions. We would try and be competitive with respect to whatever transaction would come up, recognising we would still have to be mindful of whatever our production options are.” ■



The twinjet has been seen for the first time outside the Mirabel factory

Claude Bouley



Brazilian navy to get KC-2s
NEWS FOCUS P25

FORECAST CHRIS SEYMOUR LONDON

Regionals' growth potential

In the first of three articles on Ascend's vision for the future shape of the global fleet, we focus on sub-100-seat market

The regional airline market remains an important and dynamic sector. The 2014 Flightglobal Fleet Forecast, produced by Ascend, predicts almost 6,700 new deliveries of turboprops and regional jets in the next 20 years – a total valued at \$184 billion.

Although this represents just 18% of Ascend's entire 36,800-strong airliner delivery forecast for the period – 7% by value – the sector will see the introduction of new types, a re-engined family, increased seating and “combi” versions in the next five years.

SIGNIFICANT REDUCTION

The sector's turboprop fleet has seen a significant reduction in size over the last 20 years, as the market for smaller 19- and 30-seat types declined – especially in the mature US and European markets.

However, demand from emerging markets and the good seat-mile economics of larger 70-seat turboprops has led to a stabilisation of the fleet at around 3,500 examples. A modest annual increase in the fleet began in 2013, and is forecast to continue.

The majority of deliveries will be 70-seater types such as the ATR 72 and Bombardier Q400, with the Chinese Xian MA700 now under development for the



ATR has been at the forefront of proposals for a 90-seat turboprop

end of the decade.

Meanwhile, although ATR has been at the forefront of proposals, there is no immediate prospect for the launch of any new 90-seater programme. However, it seems inevitable that at least one will eventually emerge.

Some 32% of deliveries are predicted to be for this larger size, with its better seat-mile economics enabling replacement of current 70-seaters, and potentially older regional jets.

In the interim, both ATR and Bombardier are fitting more seats in their existing designs – 80 seats for the ATR 72 and 86 seats for the Q400, which will also be available in a new combi variant.

The 50-seat regional jet fleet that drove explosive growth in the late 1990s and early 2000s

has been marginalised by higher oil prices. At the same time, US scope clauses have been eased and now permit the replacement of many of these aircraft with more efficient 76-seat jets.

However, the regional jet fleet is still forecast to grow by around 1,100 aircraft over 20 years, with the arrival of new programmes spurring further growth. The main focus for the fleet is in the two largest seat sizes – the 85- and 100-seaters, which will increase their share of the total regional jet fleet from 42% to 95% by 2033.

Relatively few 70-seat jets will be delivered, as 85-seaters are becoming the smallest effective regional jet. Ascend expects these types to take a 36% share of deliveries.

The 4,085 regional jet deliveries

forecast will be used for growth and to replace some 87% of the current fleet – almost 3,000 aircraft. Ascend expects 100-seaters to take a delivery share of 60%, as there is good opportunity for both growth and replacement. This large regional jet size now spans capacities between 90 seats up to 144, which Embraer's E195-E2 will offer in a high-density layout.

EXPORT MARKETS

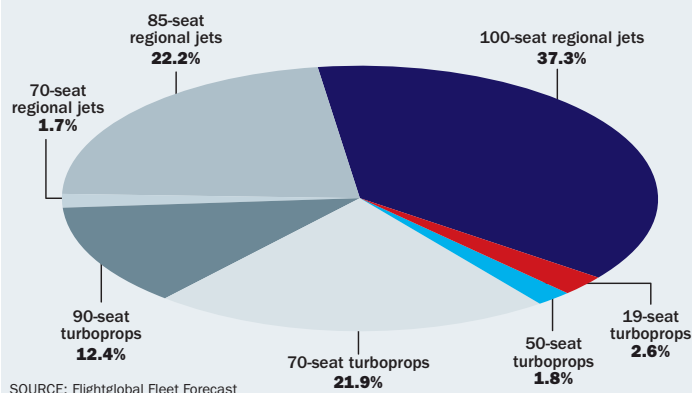
Russia's Sukhoi Superjet 100 is being pitched at export markets beyond Mexico and Indonesia, while the Bombardier CRJ1000 has won limited orders to date. Embraer's E190 remains the market leader, and the airframer's decision to re-engine E-Jets with Pratt & Whitney PurePower geared turbofans should maintain this position.

However, the development of the 110-160-seat Bombardier CSeries single-aisle family gives operators another choice in the seat sizes served by larger regional jets.

India, meanwhile, is evaluating the development of its own 70-100 seater for the 2020s, so the range of suitable aircraft for regional airlines looks set to increase further in the coming decades. ■

Chris Seymour is head of market analysis at Ascend

REGIONAL AIRLINER DELIVERIES – 2014-2033



DOWNLOAD A FLEET FORECAST TASTER

Flightglobal's consultancy division Ascend has launched its 2014 long-term forecast report for the commercial aviation sector. The Flightglobal Fleet Forecast is available by subscription only and predicts the delivery of 36,800 commercial jets and turboprops over the next 20 years, worth almost \$2.6 trillion.

The report includes information such as predicted deliveries by the major manufacturers, an annual breakdown of new fleets and an in-depth commentary covering key industry drivers such as traffic growth, oil prices and aircraft financing.

To download a sample document and find out how to subscribe to the forecast, visit flightglobal.com/fleetforecast





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A detailed look at
the world's military
simulators
CENSUS P26

EQUIPMENT FELIPE SALLES RIO DE JANEIRO

Brazil revives Turbo Trader deal

Long-delayed programme allows refurbished and re-engined Grumman S-2 Trackers to serve on short-deck carrier

A contract amendment signed on 7 November by the Brazilian navy's aeronautics directorate and Marsh Aviation revives a long-delayed programme to refurbish and re-engine four ex-US Navy Grumman S-2 Trackers. The terms of the new deal also acknowledge the entry of Elbit Systems of America's subsidiary M7 Aviation, of San Antonio, Texas, into the programme.

Brazil's original Tracker contract was signed on 20 October 2011 and covered airframe refurbishment, re-engining and systems transformation of four former USN-operated C-1A Traders into "KC-2" Turbo Traders. It also looked set to revive the C-1A fleet for military operations; a role that had been on hold since the US service had retired the aircraft 26 years ago.

Due to its age, the Brazilian navy's aircraft carrier *São Paulo* is constrained in both catapult strength and flight deck length, making the operation of the modern but much larger and heavier Northrop Grumman E-2D Hawkeye aircraft impossible. As a result of this limiting factor, the service acquired eight C-1A airframes previously stored in the US military's aircraft "boneyard" outside Tucson, Arizona. The transaction is listed as a "grant" in a database maintained by the US Defense Security Cooperation Agency, which records the current value of each C-1A airframe as being \$32,000.

PROVEN

Seeking to minimise risk, Brazil decided to rely on a tried and tested re-engining programme developed by Marsh Aviation to have four of the aircraft converted to carrier on-board delivery and air-to-air refueling aircraft.

The C-1A's original Wright R-1820-8WA radial engines will be replaced by Honeywell



Old C-1As will get Honeywell turboprops and Astronautics electronic instruments as part of the upgrade

TPE331-14GR turboprops fitted with Hartzell HC-135MA-5 five-bladed propellers. The type's analogue cockpit is also to be modernised with an Astronautics electronic flight instrument system kit. Brazil's acquired Traders are currently stored in the Marsh Aviation lot in Mesa, Arizona.

Brazil's S-2 modernisation programme was first delayed because Marsh's conversion line was effectively closed since the end of Turbo Tracker deliveries to the California Department of Forestry & Fire Protection, and had to be restarted from scratch. After that, Marsh and its president were charged with conspiracy to violate the Arms Export Control Act by supplying refit T-76 engines for the North American OV-10 Bronco to the embargoed Venezuelan air force between 2005 and 2008.

As a US government investigation was started on Marsh's activities, nearly bankrupting it, the S-2 conversion project for the Brazilian navy was suspended

for several years.

"This has caused the temporary loss of [Marsh Aviation's] ability to legally continue to deliver the contracted services", the Brazilian navy said in March 2013. It added that "Marsh has been found innocent by the US Department of Justice in October 2012", but its then-president Floyd Stilwell had to plead guilty, pay a \$250,000 fine and step down from his position, to be replaced by his daughter.

SCHEDULE

A technical assistance agreement was signed in 2013 between the navy and Marsh, allowing for a number of State Department recommendations to be adopted by the contractor.

The Brazilian navy's way around these issues was to approve a Marsh Aviation plan to establish an alliance with Elbit Systems of America's M7 subsidiary. Marsh and M7 will now proceed with the execution of the re-engining and upgrade services,

with the former remaining as the "main contractor". This should stave off bankruptcy and keep the Brazilian contract "alive" through all the turbulence.

A first KC-2 prototype flight is expected in November 2017, and the delivery of the first operational aircraft to the Brazilian navy is scheduled for December 2018.

Future KC-2 flight crew are already receiving basic flying training at the Brazilian air force academy. Carrier conversion is to be performed with the USN, where the crews will fly the Boeing/BAE Systems T-45 at NAS Kingsville, Texas, and later join the advanced multi-engine E-2/C-2 pipeline in Corpus Christi, Texas, flying the Beechcraft T-44C Pegasus.

When they are delivered, the Turbo Traders and Trackers will be operated by the newly created First Transport and Early Warning Squadron (VEC-1) based at the Sao Pedro d'Aldeia Naval Air Station located west of Rio de Janeiro. ■



Ref Features



MH-60R tactical operational flight trainers are now in service with the US Navy

ANTOINE FARFARD LONDON

A total of 74% of the close to 2,000 simulators in the defence sector are made by five manufacturers. L-3 Link Simulation & Training, a division of L-3 Communications, leads the market with a 24% share of active simulators, according to Flightglobal's latest Military Simulator Census.

Boeing follows with a 16% share, while Canada-based CAE – the leading manufacturer in the civil market – is featured in third place with a share of 13% of devices. FSI and Thales follow with market shares of 11% and 10%, respectively, while the remaining 25% of the market is made up of other manufacturers.

Boeing types are the leading simulated aircraft, with 23% of the market, followed by Lockheed Martin and Beechcraft, with shares of 18% and 9% respectively. Helicopter manufacturers Sikorsky and Bell Helicopter follow, with shares of 5% each, while the remaining share of manufacturers account for 40%.

In terms of aircraft types, there are more than 200 Lockheed Martin F-16 simulators – 11% of the market – with simulators for the

MARKET REALITY

What is the distribution of military training devices by aircraft type, brand and location around the world? Our annual Military Simulator Census has the answers

Beechcraft T-6 Texan II training aircraft being the next most commonly used. The special mission Boeing P-8A Poseidon and the combat F/A-18 Hornet and F-15 Eagle all have a 4% market share. Most of the transport/tanker simulators are for the Lockheed Martin C-130 Hercules and C-130J Super Hercules. The majority of the simulated helicopter types are Boeing AH-64 Apache and Sikorsky SH-60 Seahawks, which have shares of 8% and 7%, respectively.

Combat aircraft simulators account for 34%

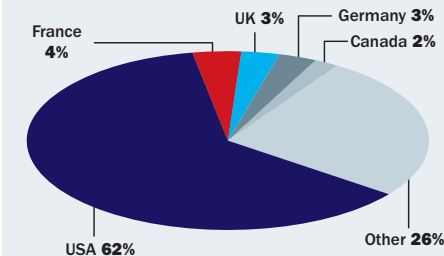
of the market, while helicopter simulators total 31%. Training aircraft, special mission and transports/tankers account for 14%, 12% and 8%, respectively. UAV simulators currently represent only 1% of the share of military simulators.

The USA is where 62% of the world's aircraft military simulators are based, with more than 1,200 devices. The US Air Force alone operates 569 devices – a market share of 46% of the simulators within the USA, and a share of 29% of the world's military simulators. The



MILITARY SIMULATOR SHARE BY COUNTRY

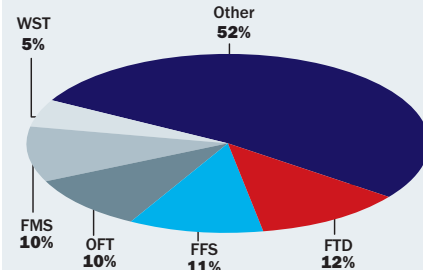
Total number of simulators = 1,991



SOURCE: Flightglobal

MILITARY SIMULATOR SHARE BY DEVICE TYPE

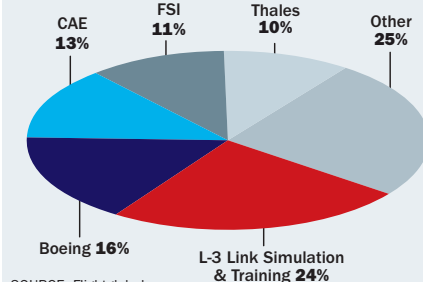
Total number of simulators = 1,991



SOURCE: Flightglobal

MARKET SHARE BY MILITARY SIMULATOR MANUFACTURER

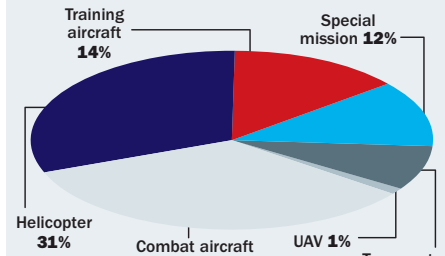
Total number of simulators = 1,991



SOURCE: Flightglobal

MILITARY SIMULATOR SHARE BY AIRCRAFT CATEGORY

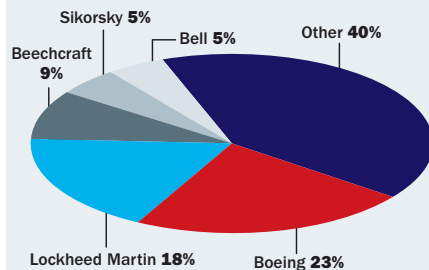
Total number of simulators = 1,991



SOURCE: Flightglobal

MILITARY SIMULATOR SHARE BY AIRCRAFT MANUFACTURER

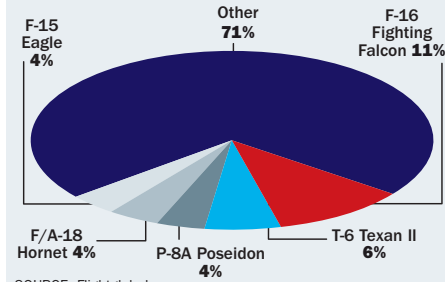
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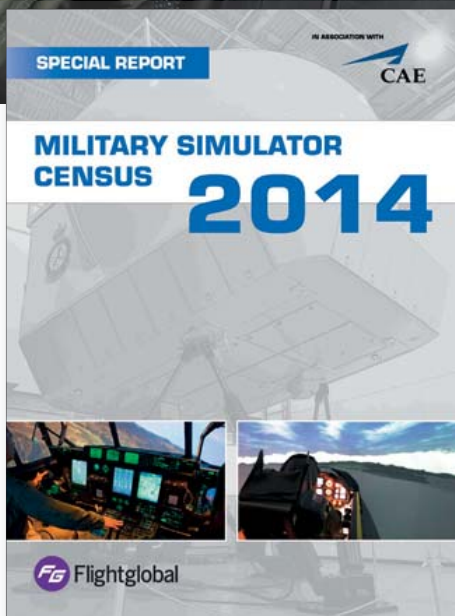
SOURCE: Flightglobal

MILITARY SIMULATOR SHARE BY AIRCRAFT TYPE

Total number of simulators = 1,991



SOURCE: Flightglobal



The full report is free to download now

US Navy, Army and Marine Corps have a share of 26%, 22% and 5% respectively in the USA. The remaining 1% are managed by other operators.

France accounts for a share of 4% of the world's simulators, while the UK and Germany have 3% each. Canada has a share of 2%, while the balance of 26% of simulators is located in other countries.

Flight training devices (FTDs) account for 12% of all military simulators, followed by

full flight simulators (FFSs) with 11%. Operational flight trainers (OFTs) and full mission simulators (FMSs) both have a share of 10% each, while weapon systems trainers (WSTs) account for 5%.

The Military Simulator Census 2014, sponsored by CAE, features a listing of military simulators, including operator and device information by aircraft type and by country. The census can be downloaded for free at Flightglobal.com/milisim



CAE offers training centres, training services, and simulation products for maritime patrol aircraft.

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www.flightglobal.com/milisim



British troops are leaving Afghanistan, but not trouble, behind

NEW FORM OF DEFENCE

The UK's armed forces – like many of their counterparts in Europe – are facing a double challenge: how to create effective air capabilities in an age of austerity and unpredictable threats



DAVID LEARMOUNT RAF NORTHOLT

European defence forces are facing a “perfect storm”, and those in the UK are at its eye. So believes Andrew Dorman, professor of international security in the Defence Studies Department at King's College London and a lecturer at the UK Joint Services Command and Staff College in Shrivenham.

The forces energising the storm are many, Dorman says, but he sums up the challenge as “ambiguous warfare in an age of austerity”. The “ambiguous” tag refers to the enemy not always being easy to identify; it may be a group rather than a nation and in a state of flux rather than being a recognisable entity. Since the UK's Strategic Defence and Security Review (SDSR) of 2010 was carried out, the world has changed dramatically, he points out, and plans for the UK's defence and for projecting its influence envisaged then look hopelessly inappropriate now. Budget austerity completes the storm's destructive power.

Dorman's comments were made at a conference of the UK Royal Air Force Air Combat Support Group. At this annual event, the group's air officer commanding, Air Vice-Marshal Sean Reynolds, gathers his force leaders

and senior officers at RAF Northolt, London, to ponder the challenges they are likely to face, and to share experiences and views. Dorman's task was to present his opinion of the macroeconomic state of affairs as it affects the military generally, plus a specialist academic's view of the global threat landscape.

The RAF's Air Combat Support Group has recently been through a testing time, with its resources fully stretched to meet government commitments. Its transport capabilities have just been engaged in bringing British forces and their equipment back from Afghanistan. The operation has gone without a hitch, despite other demands on the group which, since September 2013, has also retired the Lockheed Martin C-130K, Vickers VC10 and Lockheed TriStar and put into operation the Airbus A330 Voyager tanker/transport. It is, at present, engaged in training and organising for the introduction of the Airbus A400M tactical transport.

Also in the last few months, Whitehall called at short notice for the RAF to join the US Air Force in mounting strikes against Islamic State (IS) forces in northern Iraq, and providing humanitarian relief to groups under attack. That entailed deploying strike and Combat Support Group elements to oper-



ate out of RAF Akrotiri in Cyprus, using C-130Js to drop supplies to beleaguered locals, and ensuring that the Voyager got its first real conflict “outing”, initially refuelling Panavia Tornado GR4s on reconnaissance and then strike missions.

INSTABILITY

Dorman put to the gathering the proposition that at the time of the last SDSR in 2010, nobody would have predicted that a Tunisian people's revolt – in December of that year – would have toppled the government, launching what be-



Russia has used Tupolev Tu-95s to flex its muscles

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The Royal Navy's new carriers may in the event be short of embarked aircraft

Aircraft Carrier Alliance

Tornado GR4s are now being flown over Iraq with Voyager tanker support



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"The 2015 SDSR is set to be more complex and contentious than the government might have hoped"

ROYAL INSTITUTE OF INTERNATIONAL AFFAIRS

a corrupt but pro-Russian government and Moscow's reaction: annexing Crimea and supporting rebellion in eastern Ukraine. Finally, tying into that, is the imposition of Western economic sanctions against Russia, which has provoked President Vladimir Putin to flex his military muscle in a style reminiscent of the Cold War.

In the week before the conference there had been eight incidents of Russian Tupolev Tu-95 long-range bombers provoking RAF Eurofighter Typhoon interceptions over the North Sea: a somewhat higher than normal rate clearly intended by Putin to impart a message.

Add to these threats a rise in cyber-attack probes, says Dorman, not just on military assets but on infrastructure services and utilities. These are the types of threats faced by Western militaries now, and the RAF leaders at Northolt were to ponder was what part the UK could play in containing them, and with what tools.

came known as the Arab Spring. Emphasising the unpredictability of today's emerging threats, he listed a series of events that amount to a roll-call of turmoil. These covered the sheer extent of Syria's internal strife and its destabilising effect on the whole Middle East; the rise of the well-funded, highly militant IS movement in Iraq and Syria; the Western intervention in Libya and the internal instability it has unleashed; Egypt's overthrow of the established military regime, then its reversion to the military when democracy didn't work as envisaged. Also mentioned were Ukraine's move to replace

Next year there will be another SDSR, and Chatham House, the London-based Royal Institute of International Affairs, has this to say about it: "With unfinished business from its 2010 predecessor, and with no sign that UK national strategy is about to escape the grip of austerity, the 2015 SDSR is set to be more complex and contentious than the government might have hoped. There is a possibility that the review will, yet again, see the three armed services struggle against each other to secure the largest slice of a diminishing cake."

It is not as if the UK government is unaware of these changes. In July, it launched a review of existing Future Force 2020 plans, acknowledging that things had changed. It referred to "the impact on the plans for FF 2020 of the challenging global political and security context, including in Ukraine, the Middle East and Africa; the changing size, structures and priorities of other international forces including those of the UK's usual allies; and decisions on Scottish independence."

AUSTERITY

The Scottish independence issue, it is generally agreed, is a genie that cannot be stuffed back into the bottle just because it was rejected in a September referendum. The biggest single factor in UK defence strategy that is clouded by the possibility of Scottish independence is the nation's submarine-based Trident nuclear deterrent. This is based at Faslane in Scotland, and the Scottish National Party declares it wants none of it following its planned separation. Yet, Dorman remarks, quoting former Prime Minister Tony Blair, however cash-strapped the UK government is, no prime minister wants to be the one who drops Britain's nuclear deterrent.

Money is, indeed, the problem – and it will remain so. Dorman characterises the UK's cautiously acknowledged economic upturn as "a tax-free recovery", because so many individuals and small businesses are living on the margins of economic viability, even if they

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Air Combat Support Group tasks have included bringing UK equipment back from Afghanistan



New demands will be made of the RAF's growing Chinook helicopter force

» remain in work or solvency. He also talks of “a post-heroic population”, which appreciates what its servicemen do but does not want to pay for it. The 2015 defence review will be more brutal than the last, Dorman argues, because financial austerity is still warranted, health and education budgets are ring-fenced, and so defence will inevitably be hit again.

Meanwhile, Dorman's judgements about the existing FF 2020 are scathing, calling its defined force structure “an unaffordable, land-centric, top-heavy military designed to fail”. Personnel cuts at the last review were at the front line, with hardly any reductions at the one-star level and above, he notes. The Royal Navy, he believes, needs more destroyers and frigates but is getting two aircraft carriers which may end up with insufficient numbers of embarked aircraft, and it has amphibious forces when these are increasingly difficult to justify. It is clear that Dorman would be surprised if the UK gets the promised numbers of Lockheed F-35B combat aircraft after the 2015 SDSR.

The revised FF 2020 plan depends heavily on cutting the regular forces and topping up

“There is only one thing worse than a shrinking customer base, and that is a shrinking customer base with shrinking budgets”

TONY TONER

Retired group captain, RAF

their capability with larger reserves. While not dismissing the concept, Dorman suggests alternative approaches might be considered, especially by the British Army. He observes that perhaps a standing force of 80,000 is unnecessary and 50,000 might do. To put that in context, before the last SDSR, the army's strength was more than 100,000. Increased equipment mothballing might also provide a lower-cost way to upscale when necessary, providing instant reaction is not required. Pooling capability with allies is already under examination but may become more general.

Looking at the future operating environment, a senior officer from Shrivenham observes that

the global tendency for population drift from rural areas into cities, particularly mega-cities, changes the whole nature of effective warfare, making a large conventional army less relevant and heightening the importance of precision air strikes and special-forces deployment. The need for a strike element is the one RAF capability that is not questioned in any of the defence reviews, but if special-forces deployment and humanitarian aid and disaster-relief work rise in importance, the Combat Support Group's new transports and its Boeing CH-47 Chinook force will be increasingly called upon to deliver.

In line with the Chatham House prediction that inter-service rivalry will heighten, Dorman describes the army's force of retired generals as “already mobilised and rabid” and engaged in lobbying via the media against further reductions in standing manpower.

The age of austerity means new solutions have to be found. Dorman observes that, at present, “there is no incentive for departments not to spend their entire budget”. Could military leaders, he asks, be given the choice of where to make economies and efficiencies in their complete force, rather than “use or lose” departmental budgets? The government has to find ways to incentivise on-the-hoof cost-saving by the military, rather than simply imposing budgets.

SAFETY

A study of the joint service Military Aviation Authority's (MAA) most recent published report reveals that the MAA warns of the risk to safe air operations of cuts made without thought for their secondary effects. Following the 2006 fatal loss of a BAE Systems Nimrod MR2 over Afghanistan because of design faults and engineering complacency, a review by barrister Charles Haddon-Cave of the culture that led to the accident was scathing about the attitude of passivity engendered in the military by having continually to adjust to changing objectives.

The MAA was created to rectify this by providing a broader oversight of capability. Now the MAA faces cuts and in its 2012-2013 report warns: “Further reductions [at the MAA] could re-create the conditions of which the Haddon-Cave report was so critical.” The single most repeated lament in the report is a shortage, across the board, of “suitably qualified and experienced personnel”. Those cannot be conjured up at short notice.

Airbus Defence & Space representative retired Grp Capt Tony Toner emphasised the company's support for the RAF's Voyager and A400M fleets, but added that manufacturers and service providers will be much more careful about the nature of the military contracts they sign now that the Western military market is shrinking.

“There is only one thing worse than a shrinking customer base, and that is a shrinking customer base with shrinking budgets.” ■

BABAK TAGHVAEE TEHRAN

When the sole airworthy HESA IrAn-140 turboprop crashed on take-off from Tehran in August, Iran's hopes of becoming an aerospace-manufacturing nation appeared to be dashed with it. The decade and a half following Antonov's decision to license production of its An-140 to Iran has seen no more than a dozen IrAn-140s roll off the assembly line, no fewer than four accidents involving the type and a regulatory ban on all flight operations by the aircraft.

The first IrAn-140 made its maiden flight in 2001. Since then, just 11 more airframes have been manufactured and Iran has struggled to find enough customers to make the programme commercially viable. The aircraft was billed as being a symbol of Iran's achievement in the aviation industry. But the history of the IrAn-140 programme has been peppered with safety concerns, complaints from Iranian aviation experts about the licence-production contract, and the weak performance of the aircraft.

LENGTHY HISTORY

The story began back in 1974, when the Iranian government held an international tender to manufacture a helicopter under licence in Iran. Agusta, Sikorsky, Aérospatiale and Bell Textron participated in the tender, and the latter won because of its experience in Iran's helicopter industry in the 1960s. Iran Aircraft Manufacturing Industries (HESA) was established in 1975, with the primary goal of licence production of Bell 214 utility helicopters.

Bell designed a plan to construct a helicopter factory, and the first phase of the build started in 1978. But the project was cancelled after the Iranian revolution of 1979, when just 30% of the facility had been completed.

Fast-forward to 1995 and the Iranian Defence Industries Organisation (DIO) had a change of heart and decided to hold a tender for licence production of a regional 50-seat turboprop. Several companies, including Antonov, CASA, Ilyushin, Aerei da Trasporto Regionale (ATR), Tupolev and Saab decided to, or were invited to participate, but international sanctions and political pressure left Antonov as the sole candidate.

Poor economic conditions in Ukraine meant that Antonov was ready to meet all of the Iranian government's needs for licence production of the An-140, even though pro-

The Iranian regime pressed ahead, determined to prove that it remained unhindered by US sanctions

All five of Sepahan Airlines' examples are grounded because of a lack of spare parts



GROUNDDED DREAM

Launched to prove that the Islamic Republic could produce a commercially viable turboprop, The IrAn-140 programme has been marked by tragedy and failure

duction of the aircraft was still in its initial phase and the efficiency of the An-140 was unclear. Many Iranian civil and military aviation experts were against the project, believing that the government was risking investing millions in an aircraft that had yet to fly.

But the Iranian regime pressed ahead, determined to prove that it remained unhindered by US sanctions. On 17 September 1997, the first prototype of the An-140 flew – at the same time, aircraft assembly lines at the HESA factory in Shahin-Shahr were still being completed. The following year, the first knockdown kit of an An-140-100 was delivered to HESA and final assembly was performed by Iranian and Ukrainian mechanics in Iran.

Three years later, on 8 February 2001, the maiden flight of the first IrAn-140 was performed during a ceremony at Shahin-Shahr, three days before the 23rd anniversary of the Islamic revolution. During the ceremony, the Iranian first vice-president and minister of defence and Ukraine's prime minister made speeches about the achievement, which was described as being the dream of the Iranian people.

The second licence-built IrAn-140 (HESA 90-02) was unveiled in December 2002. Three days before the ceremony, a Ukraine-built Aeromist Kharkov An-140-100 had crashed on approach near Isfahan, Iran. All 44 people on board – mainly Ukrainian and Russian aviation experts – were killed. Pilot error was



cited as the reason for the accident.

Tehran-based Safiran Airlines hire-purchased all three manufactured IrAn-140s in 2005, and the registration codes EP-SFD, EP-SFE and EP-SFF were awarded in March of that year. Just five months later, on 12 August 2005, EP-SFD's right engine failed while landing at Arak airport in Iran, and the aircraft overran the runway, damaging its fuselage. Technical failure in the number-two engine's fuel control unit was found to have been the cause.

EP-SFE and EP-SFF remained in service with Safiran until December 2005, when they were sold back to HESA.

It became clear during the 10 months in which Safiran operated the IrAn-140 that the aircraft's Klimov TV3-117VMA-SBM1 engines were not suited to Iranian meteorological conditions. But Iran Air Tours remained a potential buyer and three more aircraft were still in production.

In 2008, the Iranian police force was awarded a budget of \$50 million to renew its aircraft fleet, and as part of this renewal, two IrAn-140s (the former EP-SFE and EP-SFF) were ordered. The aircraft were delivered during an official ceremony at Shahin-Shahr on 8 October 2008. The serial numbers 2201 and 2202, along with Iranian police markings, were painted on the fuselage. Police pilots and technicians were quickly trained and both IrAn-140s were stationed at Mehrabad International airport.

With no potential buyers lined up, HESA and DIO decided to establish their own regional airline to operate the aircraft

Disaster struck again on 15 February 2009, when the fourth manufactured IrAn-140 crashed on final approach at Shahin-Shahr airport, killing all five on board. The aircraft was on a training flight as part of Iran Air Tours' type-transition pilot training programme, following its order for 10 IrAn-140s.

GROUNDED

Iran's civil aviation organisation withdrew the certificate of airworthiness for three IrAn-140 examples, and the Iranian police force grounded its fleet. Later that year, Iran Air Tours cancelled its IrAn-140 order.

In 2010, licence production of four more airframes was completed after a three-year delay. But with no potential buyers lined up, HESA and DIO decided to establish their own regional airline to operate the aircraft domestically.

The airline's first flight, from Isfahan to Tehran, took place on 19 January 2011. The carrier was registered as HESA Airlines and was later renamed Sepahan Airlines.

All six aircraft were quickly registered under the airline's air operator's certificate and Isfahan International airport was selected as the carrier's hub. By May 2011, IrAn-140s were being operated by Sepahan on five main routes: Isfahan-Tehran; Tehran-Tabas; Isfahan-Kish; Kish-Bandar; Abbas-Kish; and Isfahan-Tabas.

The weak performance of the aircraft's engines left Sepahan's IrAn-140s restricted to carrying a maximum of 37 passengers. Antonov had been offered the Pratt & Whitney Canada PW127A engine as a replacement for the TV3-117VMA-SBM1s, but sanctions meant that HESA could not implement the engine change.

By October 2011, Sepahan had introduced eight more routes to new destinations, including Kerman, Qeshm, Yazd, Bushehr, Asalouyeh and Orumiyeh, and its weekly number of flights had reached 14.

But US political pressure on Ukraine led Antonov to stop supplying spare parts for the IrAn-140, resulting in the grounding of half of Sepahan's fleet. The airline's weekly flights had dropped to just four by February 2012. Also, in July 2012 several of Sepahan's IrAn-140 co-pilots resigned due to salary issues and the lack of flights.

Yet with just three airworthy IrAn-140s, Sepahan went on to introduce 12 more destinations, as well as two new international flights, to Dubai and Doha. Three airworthy aircraft quickly became one, but this final example also proved ill fated.

On 10 August 2014, Sepahan's sole airworthy IrAn-140-100 was involved in a fatal crash. The aircraft's number-two engine flamed out on take-off from Tehran Mehrabad International airport, and the pilot requested emergency landing clearance. But the flight-crew realised this was not going to be possible, and as the aircraft was on the verge of stalling they decided to perform an emergency landing on Shishe Mina Boulevard, to the northwest of the airport.

While the aircraft was descending and turning to the north, its right wing struck a water tank on top of a building. Control was lost and the aircraft collided with the wall of the Iranian Turbine Engine Organisation, where IrAn-140 engines were being assembled. Ten passengers managed to escape from the wreckage, but the remaining occupants were killed when it exploded.

After the accident, the Iranian Civil Aviation Organisation banned all flight operations of the IrAn-140 until investigation teams from HESA and Antonov could determine the cause of the crash.

However, all five of Sepahan's remaining IrAn-140s had already been grounded because of a lack of spare parts. Two other airframes that had been completed in 2013 are not considered airworthy for the same reason. ■

From yuckspeak to tales of yore, send your offcuts to murdo.morrison@flightglobal.com

Toulouse talk

Old habits die hard at British Airways. The newfangled concept of Airbus widebodies seems to be taking its time to sink in at the flag carrier.

The cabin services director on a recent London to Singapore flight warmly welcomed passengers aboard the “Boeing A380”. Maybe some BA long-haul crew are sticking to the philosophy that they are only going if it’s a Boeing.

British scareways

On the subject of Birdseed, nervous attendees on its fear of flying course may be relieved to learn that the reassuring tones of the senior pilot who runs it belong to a Captain Allright.

Russian bear

For a heart-warming – or least bear-warming – tale, consider the crew of a Russian air force Mi-26 helicopter on a routine transport flight in the Arctic zone who spotted a lone polar bear cub wandering along the Chukota shore.

Taking a few passes and seeing no trace of the cub’s mother, they set down to help. According to the airmen, the bear was exhausted and not at all aggressive, so they gave it a little warm food and brought it on board. The cub – now named Umka after a popular Russian cartoon bear – “wandered around inside the helicopter, looked around and made friends with its rescuers”.

The crew deserve credit for more than rescuing an adorable, furry creature; polar bears are



You don’t want to meet my mum



Taking a bit of getting used to

registered in Russia’s Red Book of endangered species, and Umka is now safe in a wildlife reserve on Wrangel Island.

Tesco grounded

Troubled UK supermarket Tesco is selling its four business jets. As its advertising slogan says: “Every little helps”.

Supermodels

It used to be about trying to glue the wings on straight and making sure the propellers didn’t snap. Now, making model aircraft has gone high tech.

Airfix has used light radar scanning for the first time to develop its 2015 range. This means models can be mapped directly from an aircraft, rather than relying on blueprints or photographs. In their quest for perfection, Airfix designers travelled to Norway to scan a Heinkel He 111, fully restored after it crashed during the Second World War, and sought out the only remaining Boulton Paul Defiant.

Swing-win

If you love the Tornado, but can’t tell auto wing sweep manoeuvre flaps from arrestor hooks, then the helpful folks at Haynes might have the solution.

Weighing in at over 150 pages and including more than 300 photographs, the definitive user manual has been produced as the Panavia-developed type has hit 40 years since its first flight.

“Loved by pilots and revered by ground crew, the GR4 version is now approaching its twilight years, but is still admired by its allies and feared by its enemies,” says former Royal Air Force pilot and Haynes book author Ian Black.

As well as detailing the variable geometry type’s most complex design traits across all models, the volume also covers the Tornado’s long operational history with the air forces of Germany, Italy, the UK and export user Saudi Arabia.

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Dropping in

Later information from Romanshorn confirms the

100 YEARS AGO

report that a bomb from a British aeroplane crashed through the glass

roof of the large Zeppelin factory, making a hole from two to three yards square. Much damage was done to material intended for building airships, and the damage otherwise done was great.

Target practice

In the United States the Army Air Corps has done a series of

75 YEARS AGO

tests at Wright Field, Dayton, Ohio, on a radio-controlled model

aeroplane for use as a flying target. The model is about one-third the size of a fighter and simulates to some extent the movements of a real military aircraft.

Racing the railway

Faced with growing competition from the new high-speed railway

50 YEARS AGO

service, the two leading Japanese domestic airlines, All Nippon and JAL,

have agreed to adjust the timing of their services between Tokyo and Osaka in order to offer travellers a flight every 30min in each direction.

Counting the cost

Boeing is not yet ready to predict the amount of damage

25 YEARS AGO

done to its delivery schedules by the 48-day machinists’ union strike, which

ended with agreement on a new contract last week. The company managed to deliver 24 aircraft, using supervisory and management personnel.



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In defence of the AF447 decisions

Peter Gray's letter "Catalogue of errors on AF447" (*Flight International*, 4-10 November) contains a few errors as far as I can see. Firstly, there wasn't at any stage in the run up to or during the event, a single pilot on the flightdeck. The captain retired to the bunk and left the operating first officer in the right seat and the heavy first officer occupying the captain's seat.

Secondly, upon returning to the flightdeck, it was not immediately obvious to the captain what was happening and it is almost certain that he wouldn't have been able to see that the first officer was holding full back stick; leaving only the primary flight displays to make sense of the situation (which he did eventually but unfortunately too late). Finally, and most importantly, Mr Gray states that levelling the wings and selecting appropriate power may have saved them.

I have seen the BEA simulation showing what the instruments were displaying as well as side stick and therefore control surface deflection. Unfortunately,

TRAINING

Monitoring systems is not flying

When I learnt to fly, many pilots started with PPLs [private pilot licences], building up hours to obtain a CPL [commercial pilot licence] before being able to move onwards and upwards! This meant patience, perseverance and often hardship. It also meant the accumulation of a lot of varied hands-on experience.

Virgin Atlantic intends to propel newly qualified pilots directly into the right hand seat with presumably a reasonable amount of theoretical knowledge and effectively no practical experience whatsoever (*Flight International*, 4-10 November). It is assumed, I imagine, that these fledglings will learn from older pilots who actually have little more practical flying experience.

Presumably these same right hand seat pilots will graduate eventually to the left hand seat? I find this prospect terrifying!

When sitting behind, but not touching, the controls of an aircraft that is largely flying itself, how does one accumulate the necessary abilities for handling an aircraft in unexpected circumstances? This is a short cut to repeats of AF447.

Undoubtedly these "pilots" will become expert knob turners and key pressers. Just as surely the day an instrument misleads them or the unexpected happens and they have to fly the aircraft themselves, they will be unprepared. A pilot sitting monitoring aircraft systems gains experience in monitoring the systems; he does not gain experience as a hands-on pilot no matter how many hours are spent on the flightdeck. Remember those same pilots are there to deal with the unexpected and the undesirable. As AF447 and BA38 demonstrate, things can happen suddenly on the flightdeck.

Richard Chandless

Vovray en Bornes, France

ly, the first officer was fixated only on levelling the wings, but this proved impossible because the wings were already stalled.

I have always been taught in stall recovery that you unload the wings by pushing forward to break the stall and only then, when the wings are once again producing lift, do you attempt to level them. Or have I missed something?

Daniel Bealey

Andover, UK

A380 advocate

I feel slightly overawed in replying to an independent aviation analyst (*Flight International*,

21-27 October). But feel I am challenged to reply.

When Krishnan Iyengar states in his final paragraph that "no former Boeing 747 operator has chosen to replace them with Airbus A380s", while some have opted to replace all of their 747s exclusively with twins such as the Boeing 777, that is plainly inaccurate. Singapore Airlines, Air France, Asiana, British Airways, Korean, Lufthansa, Malaysian, Qantas, Thai are nine examples where he is inaccurate.

They may not be direct replacements, but these airlines have nevertheless ordered them to operate into hub constricted airports in replacement of 747s.

It is the same reason Emirates operates the A380 into airports such as London Heathrow. I for one will always look for the A380 over the 777 as the flying experience supercedes that of the 777. I am more than happy to be an ambassador for the A380, because frankly the experience for all classes is superior.

Rev Craig P Smith

*Ruahine Missional Anglicans
Diocese of Waiapu, New Zealand*

Praiseworthy?

Regarding "737 overrun averted" (*Flight International*, 21-27 October) – this improvised technique is not new to Boeing 737 pilots. You just don't brag about it. As a new first officer, I saw this manoeuvre about 30 years ago.

The Boeing 737-300 has an IRS [inertial reference system] and the captain knew his ground speed. The idea that the controller's wind data was somehow misleading is akin to the "dog ate my homework" excuse. How does this pilot get accolades?

An Air Transat captain ignores procedures and runs out of gas and has to glide to a landing in the Azores, and because they survived, he is declared a great airman and is paid for his speaking engagements.

In another case, a pilot lands in the Hudson River with one engine running (until his first officer shut it down below 600ft), having never moved the thrust lever up to see how much thrust it would give him, is probably the most famous pilot hero of our time.

Good aeronautical decision making makes a great pilot, not his flying skills that help him recover from those bad decisions. Just to be clear!

Daniel Mahoney

Key Colony Beach, Florida, USA



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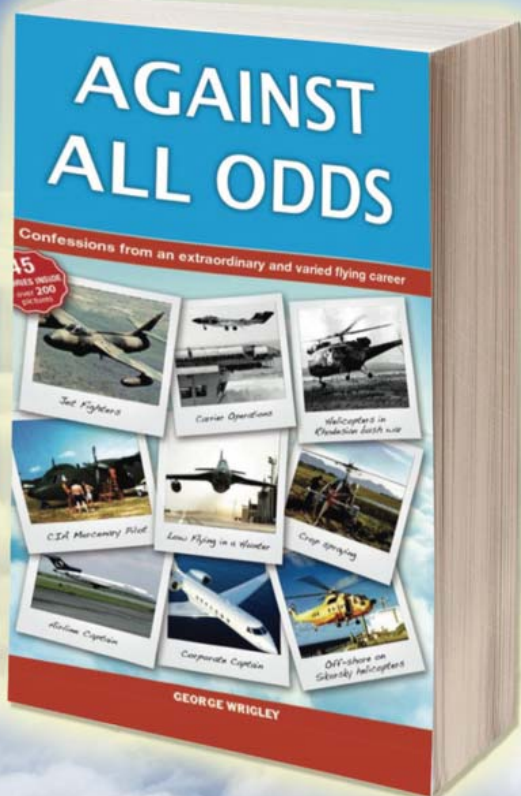
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After leaving the Air Force, he did stints crop spraying in both Rhodesia and the Western Cape in South Africa, flying a 47 Bell helicopter. He next qualified as a captain on Sikorsky helicopters doing off shore work to vessels rounding the Cape of Good Hope. He soon took the opportunity to spend an exciting year flying for the CIA from an island in the Caribbean dropping night supplies to the Contras in Nicaragua. When this contract ended, George returned to fly corporate jets for the President of Bophuthatswana and went on to become an Airline Captain in South Africa.

The stories are full of humour, romance and interesting characters he met along the way. It has good descriptions of hands on flying and also relates foolhardy escapades which he survived against all odds. It is packed with over 200 pictures to enjoy.

It is available via Kindle download or as two versions of hardcopies through Amazon at the following hyperlinks:
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FIRST OFFICER

- Possess a valid ICAO, FAA or JAA license (ATPL or CPL)
- Minimum 1500 hours total flight time with 1000 or above flight hours on multi-jet-airliner and/or multi-turbo-prop

For more details of the position, please visit Air Macau website Career Page: <http://www.airmacau.com.mo>

Interested and qualified candidates, please send your applications with a detailed CV to pilot@airmacau.com.mo

All applications will be treated with confidence and only shortlisted candidates will be notified.



DIRECTOR OF OPERATIONS

Bond Air Services is a leading provider of mission-critical helicopter services to the air ambulance, police and offshore sectors. Our fleet of 25 helicopters operate from bases across England, Wales, Scotland and Ireland helping save lives and protect communities every day.

Bond Air Services is part of Babcock International Group, a global provider of critical asset, infrastructure and training support.

The role will be based at the company headquarters at Gloucestershire Airport.

The successful candidate will:

- Possess a thorough understanding of current EASA aviation regulations so as to efficiently manage a large and complex operation.
- Have demonstrable experience in a pilot management role and be able to demonstrate professional competence in the operational field of aviation safety, accident prevention, risk analysis and management.
- Be responsible for ensuring the safe and efficient conduct of all flying operations and training for all flight crews and technical crewmembers.
- Hold a current and valid EASA CPL/ATPL (Helicopters) licence with instrument rating, preferably in a type operated by Bond Air Services.

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State of Qatar Civil Aviation Authority are recruiting for the following two positions:

Aerodrome Inspector and Rescue and Fire Fighting Inspector

This is an opportunity to be involved in the regulatory oversight and further development of Hamad International Airport, Doha.

Applicants must be medically fit and have at least 5 years regulatory experience with a well-established Civil Aviation Authority, or as an Operations Director/Manager or Senior RFFS officer at a major International airport.

- Prospective candidates should have:
 - Experience with Aerodrome Operations or Rescue Fire Fighting Service operations at a major International airport
 - Regulatory and Auditing experience of major international aerodromes
 - Familiar with implementing ICAO Annex 14 Vol.I SARPs and the ICAO Aerodrome Certification Manual Doc. 9774, or EASA equivalents
 - Experience with the development and auditing of Aerodrome Manuals and Safety Management Systems
 - Experience in developing and writing regulations would be useful
 - Working experience in a multi-cultural environment and previous experience of working in the Middle East would be an advantage
 - Applicants should preferably not be over the age of 50
- Benefits include:
 - Competitive salary, tax free in Qatar
 - Free furnished accommodation, or equivalent
 - Assistance with schooling
 - Free medical insurance in accordance with local staff
 - 5 days working week, 45 days annual leave plus local holidays
 - Annual economy class return air tickets to base country
 - End of contract bonus of 1 month basic salary for each year of contract completed

Applicants with the required background and experience should send their CVs annotated on the envelope "Aerodrome Inspector" or "Rescue and Fire Fighting Inspector" to:

QCAA, Air Safety Department, PO Box 3000, Doha, State of Qatar
Email: safety.dept@caa.gov.qa



**State of Qatar Civil Aviation Authority
Air Safety Department (Personnel Licensing Section)
is recruiting for the following positions:**

1 - Aircrew Licensing Inspector (Aeroplanes)

- Required Qualifications:
 - ATPL holder (Aeroplanes);
 - Minimum of 5000 PIC flying hours on large aircraft, e.g. A320, B777/B787;
 - Proven experience in operational or training departments with a public air transport operator or with CAA, and including experience in oversight functions;
 - Adequate knowledge and familiarity with ICAO SARPs, JAA/EASA regulations;
 - Adequate experience in the aviation training field and the use of visual and audio training aids and flight simulators;
 - Able to create and write operating procedures and manuals with minimal supervision; and
 - Highly literate in the use of computer based word processor.
- Preference will be given to applicants who:
 - Hold current aircraft type rating on Airbus or Boeing fleet;
 - Hold TRI/TRE qualifications; and
 - Possess high degree of proficiency in technical English report writing.

2 - Aircrew Licensing Inspector (Helicopter)

- Required Qualifications:
 - ATPL holder (Helicopter);
 - Minimum of 5000 PIC flying hours on multi-crew helicopters;
 - Proven experience in operational or training departments with a public air transport operator or with CAA, and including experience in oversight functions;
 - Adequate knowledge and familiarity with ICAO SARPs, JAA/EASA regulations;
 - Adequate experience in the aviation training field and the use of visual and audio training aids and flight simulators;
 - Able to create and write operating procedures and manuals with minimal supervision; and
 - Highly literate in the use of computer based word processor.
- Preference will be given to applicants who:
 - Hold current type rating on at least one multi-crew helicopter;
 - Hold TRI/TRE qualifications; and
 - Possess high degree of proficiency in technical English report writing.
- Benefits include:
 - Competitive tax-free salary
 - Fully furnished accommodation, or equivalent
 - Assistance with child schooling in accordance with staff regulations
 - Free local medical insurance in accordance with staff regulations
 - 5 days working week, 45 days annual leave plus local holidays
 - Annual economy class return air tickets to home country, in accordance with staff regulations
 - End of contract bonus of 1 month basic salary for each year of contract completed

Applicants with the required background and experience should send their CVs to:

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WORK EXPERIENCE CARL DIETRICH

Flying-car man on road to success

Carl Dietrich, founder and chief executive of US start-up manufacturer Terrafugia, believes his two-seat Transition 'roadable aircraft' could drive safety improvements in general aviation, while bringing a broader crowd to the sector

You became a pilot to be a better engineer?

I've been fascinated with aircraft and spaceships since I was eight years old. And that's when I started saving up for my pilot's licence. My hero was Burt Rutan, the guy who has designed and built more aircraft than Lockheed and Boeing put together. My friends and I would build a tree fort and they'd want to start playing in it, and I'd want to go build a better tree fort. That's how I knew I was an engineer at heart.

What support did Massachusetts Institute of Technology (MIT) offer?

I went to MIT to study aerospace engineering, stayed for about 12 years and got my bachelor's [degree], master's and PhD. Towards the end of my time there I started reading about this new light sport aircraft rule. And it struck me as a great opportunity to start doing something entrepreneurial in aviation. I won a prize at MIT for innovation and that came

with some cash, so we put together a business plan, which won an award in a business plan competition at MIT, and that came with some cash, too. So we took our fledgling company, newly incorporated, to the Air-Venture show in Oshkosh in 2006, and we walked away from that show with seven deposits from customers. For us, that was real validation that there is a market for this sort of vehicle.

What are your plans now you have 100 orders?

We're going to start production out of our current facility. We're looking to be a little more conservative with our approach and get to profitable production with a lower volume than we expect the market will demand.

It has the potential to significantly improve the level of safety of general aviation. We're bringing automotive safety technology, safety cage, crumple zone, simulated crash technology, airbags, load-limiting seat-belts,

"In Alaska, for instance, it's legal to actually take off and land on roads. Aircraft have the right of way"

head impact protection: all this stuff that's in a modern car, we're bringing that to aviation.

Because it can convert between flying and driving in less than one minute, you're really eliminating the time that you're stopped at the airport to the preflight inspection, so, five or 10 minutes. Then on the arrival end, you don't even have to get out of the vehicle. You just fold up the wings in less than a minute and drive out.

Will you be able to take off from a highway?

In order to make the idea of a flying car a practical reality, we need to increase the level of safety in personal aviation, and taking off and landing on roads is not necessarily a good idea. That's regulated on a state-by-state basis. In Alaska, for instance, it's legal to actually take off and land on roads. Aircraft actually have the right of way. But most of the areas where it is not legal to land right now, it probably won't be legal to take off there in the future. You have power lines, traffic, street signs, potholes, all these things – it may not be safe. And airports are a good idea. We have 5,000 public-use airports in the USA: one, on average, within a half-hour drive of wherever you are.



Dietrich studied at MIT for 12 years before launching Terrafugia

But your newest 4-seat design could. How does that work?

We call the vertical take-off and landing (VTOL) concept the TFX. We use electric motor pods to enable quiet VTOL. We then have a ducted fan in the rear powered by a traditional aircraft engine, which gets you into long range. Today's battery technology is not really good for long endurance. The energy density isn't there yet, but we have power density. We see TFX as something that enables a much broader segment of the population to take advantage of personal aviation. It'll be a computer-controlled fly-by-wire-vehicle: you tell the computer where you want to go. ■



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Terrafugia displays the Transition at a New York car show in 2012



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